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The thesis represents a micro-level study of the processes of family formation exhibited by iron and textile workers in the context of two Scottish towns during the second half of the nineteenth century. One of the major underlying hypotheses is that specific occupational groups may demonstrate particular forms of marital and childbearing behaviour and, moreover, that these occupationally-specific patterns may, at least in part, be explained by the nature and circumstances of the occupations themselves.

Record linkage between census enumerators' books and civil registration schedules, in the manner of family reconstitution, permitted the construction of data sets encompassing the entire reproductive careers of iron and textile workers' wives. In addition, two further groups of workers, one from each of the two towns, who were not engaged in either iron or textile manufacture, were also selected for study, in an attempt to investigate any locationally-specific patterns, possibly arising from a 'shadow effect', whereby demographic behaviour associated with either iron or textile workers may have been emulated by others living in the same town.

An initial investigation of certain of the iron and textile workers' nuptiality and fertility patterns revealed a differential in completed family size of almost one child in favour of the former group. The subsequent detailed examination of marriage and childbearing behaviour produced evidence to support an hypothesis that the textile workers were beginning to operate with a degree of success, one or more strategies designed to control fertility and ultimately limit family size. Furthermore, it was evident that this potential example of family limitation was occurring during the early stages of the overall decline in British fertility.

I hereby declare that the thesis has been composed by myself and
that the work it contains is entirely my own.

Family Formation in Victorian Scotland

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Chapter One

THE STUDY OF FAMILY FORMATION

The Need for Micro-Level Studies

In the last twenty years the study of population patterns in the past has allowed us to dispel many of the myths surrounding both family formation and household composition. For example, there is considerable evidence that the nuclear family has exhibited a large degree of 'perdurance' since at least the late sixteenth century,¹ although an element of variation within this general pattern has also been noted.² However, discussions in the field of historical demography have too often, to my mind, focused only, or at any rate primarily, upon data at a macro-level and have thus failed to give sufficient emphasis to potential internal variations.³

Historical demographers may claim (with some justification) that they are restricted by the availability of the bricks and mortar of their trade and I accept this, but only to an extent. However, it is my contention that the exercise of digging below macro-level data is not only urgently required⁴ but also perfectly feasible. For example, it is only through the study of societies at the micro-level that we will be able "to correct the naivety of much 'national' history" by replacing it with data for regions, towns and rural districts.⁵

In order to fulfil the need for historical demographic studies at a micro-level, the researcher, where possible,⁶ must revert to the individual fragments of life processes, contained within census

enumerators' books and civil registration schedules, and then reconstruct the various pieces in a format which permits sound sociological analysis. So far, however, this process of re-assembly has seldom been attempted.

The present thesis, by contrast, will attempt to do justice to the comprehensive array of demographic records in Scotland covering much of Victoria's reign. In particular, emphasis will be given to the patterns of nuptiality and fertility associated with the family formation process. In terms of design and execution one of the rationales, on which the thesis is based, lies in the apparent paradox between historical demography's explicit rejection of unsubstantiated and inaccurate claims regarding past populations and the discipline's present degree of dependence on macro-level data, which generate general statements and often preclude the achievement of greater accuracy. In my opinion, historical demography could presently be compared to a child's new colouring book, in that the lines of definition have mostly been drawn, yet much imaginative work remains before the full potential may be realised. A significant portion of this potential rests in working through data at the micro-level.

Before going on to specify the particular groups of individuals whose lives will be examined, let us look briefly at some historical demographic background and in particular at the areas of nuptiality and fertility which bear most directly upon the processes of family formation lying at the heart of the work undertaken in this thesis.

Nuptiality

In pre-industrial European societies marriage was determined almost wholly by access to the means of subsistence. That is, a man could not enter marriage and form a family without first possessing the resources necessary for ensuring the survival of the household. For example, with a large proportion of the population engaged in agriculture, this may have entailed waiting to inherit the family farm⁷ or attempting to accumulate a sufficient nest egg.⁸ On the other hand, for some permanent celibacy would have been the only option.⁹ Therefore, marriage should be regarded not simply as resulting from a desire to enter that particular state, but rather as a demonstration of the ability to meet the demands imposed upon the incumbents of that position; it is thus vital that any study of marriage contains a careful consideration of the nature of these demands.

Table 1.1 Median age at first marriage (pooled data for the 13 parishes cohorted by data of birth)

Year	Males	Females
1600-49	25.8	24.3
1650-99	25.7	24.3
1700-49	25.0	23.7
1750-99	23.3	22.0

Source: Wrigley & Schofield (1983) Table 3.

Table 1.1 shows that women in the seventeenth and eighteenth centuries were waiting until they were twenty three or twenty four before getting married. Therefore, despite the fact that Shakespeare had Juliet marry at the age of fourteen and her mother at twelve¹⁰ and notwithstanding Pepys' marriage in 1655 to a fifteen year old,¹¹ it appears unlikely that such young teenage brides were commonplace.

The data in Table 1.1 indicate that there was a two year reduction in the median female age of marriage by 1750-99; however, since the figures are aggregated for thirteen parishes, certain larger fluctuations may be concealed. For example, in the data originally presented by Wrigley for Colyton, attention was drawn to the dramatic fall in the mean female age of marriage from 30.7 years of age in 1700-01 to 23.3 years in 1825-37.¹² Some kind of relationship between the age at first marriage and a society's economic condition is almost always attempted, although exactly how the mechanism operates remains a matter for debate.¹³

Wrigley and Schofield suggest that an increase in the standard of living, experienced by a particular group in a society tends eventually to cause a lowering in the age of marriage.¹⁴ By contrast, writers like Levine and Anderson argue that increased opportunities, brought about by an expansion in certain sectors of the economy, may lead to both more marriages and to a drop in the marriage age.¹⁵ In addition, Levine has argued that a loosening of social control mechanisms, associated with industrialisation meant that individuals became freer to decide if and when to get married.¹⁶ Therefore, it is recognised that both the age of

marriage and the proportions who remained single (as well as re-marriage rates) were influenced by a cluster of socio-economic factors.

The social sciences, as a whole, have as their central tenet the idea that the lives of individuals are continuously influenced and shaped by factors located in the social or economic structures.¹⁷ The study of nuptiality is one area in which the social and economic influences operating in and alongside the lives of individuals may be identified. Marriage, then, should be regarded as an end product of a complete set of decisions and assessments entered into and explored not merely by the two intending parties but also by kin friends and those living in the near vicinity who may combine to shape both their own and others experience of present and future expectations.

Fertility

In a study of fertility in the nineteenth century, marriage is, of course, an important variable, since the overall level of fertility achieved by a particular community is determined in considerable part by the proportion of the population who were married at any age.¹⁸ Furthermore, when discussing a basically pre-contraceptive era, the age of marriage is especially important, since the postponement of this act represents one means whereby the ultimate number of children can be held in check, although care must be taken as to how this idea is applied. In particular, should the limitation in family size arising out of a postponed marriage be regarded as intentional or not? Clearly there is a problem of

inferring motives from outcomes in that a dozen different motives could yield the same observed result.

On the other hand, Sundt, in a study of marriage in Norway in the first half of the nineteenth century, found that limiting the number of children within marriage was often explicitly given as an explanation for a young man marrying an older woman.¹⁹ In contrast, Erikson and Rogers regard the practical obstacles to marriage as of greater importance and they further state that if contraceptive techniques were known (and they believe they were) then there would be little need for delayed marriage.²⁰

With the work of Henry (and perhaps Wrigley) it has become apparent that attempts to limit the size of families may have existed for much longer than was previously accepted.²¹ In fact, the whole concept of 'natural' fertility has attracted considerable debate.²² In the light of this, explanations become necessary as to how and why fertility often operated below the level of maximum capability.

Within marriage and prior to the introduction of adequate mechanical means of contraception, there were in all likelihood a number of different methods and strategies for either limiting the number or controlling the spacing of births. In this study I shall use the term 'family limitation' to refer to a **stopping** procedure, where the conscious decision to restrict the number of children by terminating childbearing may have been taken before the end of the woman's reproductive span. This is most likely to have been achieved either by abstention from sexual intercourse or by the practice of coitus interruptus. By contrast, I shall refer to 'birth control

practices' as representing any deliberate attempts at **spacing** births across the complete period of reproduction. Once again, this may have been achieved by abstaining from sexual intercourse, having recourse to coitus interruptus, by using crude and probably ineffective contraceptive devices, through folk remedies, used both to prevent conceptions or to bring about miscarriage, the procuring of abortions and the incidence of infanticide.²³ It is, of course, more than likely that some at least of these birth control methods were also used prior to and outwith marriage to prevent illegitimate births.

There is also a further category of factors which may have enabled the restriction of family size in the nineteenth century but which cannot be strictly labelled deliberate or voluntary. These include breastfeeding customs, the likelihood of sterility, sub-fecundity, the occurrence of miscarriage and certain social customs and taboos surrounding sexual behaviour, especially following the birth of a child. With some of these, for instance breastfeeding, it would in most historical populations be somewhat difficult to ascertain whether a deliberate birth spacing strategy was being practised or if this was merely an unintentional consequence of the original action.

Patterns of fertility in past populations have generally been studied within the overall framework of the demographic transition, which encompassed the move from 'traditional' societies, characterised by high fertility and high mortality, to 'modern' societies where low fertility and low mortality are more common. Studies of the demographic transition have taken two basic forms:

firstly, there are those which encapsulate the demographic development of whole societies²⁴ and secondly, those where the focus is on a more specific area, such as a particular parish, occupation or socio-economic group.²⁵ In the macro-level studies it is impossible to explore groups within the total population without falling foul of the ecological fallacy.²⁶ In contrast, work at a micro-level permits the detailed examination of specific demographic processes as exhibited by particular groups of individuals.

For the nineteenth century, much micro-demographic work is potentially possible using readily available census data; however, this can only provide a cross-sectional snapshot into the family building process.²⁷ Therefore, to trace an individual family's complete reproductive history, it is necessary to augment the census information with vital statistics from the civil registration documents and, in particular, birth registers. In Scotland a comprehensive range of civil registration schedules is available from 1855 and in a form which allows the necessary information to be extracted in preparation for linkage to the census data.²⁸ In view of this, it is therefore all the more surprising that no micro-level analysis of Scottish population patterns exists for the second half of the nineteenth century.²⁹

Therefore, the present thesis represents the first micro-level study of nineteenth century Scottish demographic data which permits a detailed examination of the various elements within the process of family formation.³⁰ Only through the various techniques of family reconstitution does it become feasible to study the age at first marriage, the age of the mother at the birth of her last child and

age-specific fertility for particular groups within the population. Specifically the present work will focus on the possible existence of family limitation at a time when the overall decline in British fertility was getting under way. Within this context, the aim is to examine the reproductive behaviour of different groups within the Scottish population, who may or may not have been in the vanguard of the fertility decline, and to point to any similarities or differences which are observed. It is therefore necessary to move the discussion to consider the particular groups which were chosen for the study.

The Groups Chosen for Study

In order to shed light on the family building process, one of the most useful approaches, from a sociological viewpoint, is to identify groups of individuals who experience similar opportunities and limitations, in relation to their economic standing and development as well as their social norms and values. Within the historical demographic literature the most common groupings of this type are social classes, geographic localities and occupational groups. Let us look first at the occupational group.

The working hypothesis underlying any decision to focus on occupational groups is based upon the assumption of the existence of a set of characteristics, which may or may not be peculiar to that form of employment, but which when taken together will in some way affect the demographic behaviour of the particular workers involved. For instance, Haines has shown that particular economic structures,

associated with certain occupations, tend to lead to particular forms of demographic behaviour.³¹ In addition, Haines claims that occupational fertility differentials have existed historically and that they can be explained by economic factors, although "the general social and status norms surrounding each occupation obviously play a role".³²

If individual occupations exhibit identifiable patterns with regard to such factors as income opportunities, family employment, risks of mortality and morbidity, residence, marriage and family composition,³³ then any analysis at a higher level of aggregation would be unable to detect any of these patterns. This then calls into question the appropriateness of social class as an analytic category within this specific context.

It would seem that social class would deposit too many dissimilar groups into the same box; the skilled craftsman, the agricultural labourer, the factory hand, the apprentice, the carter and the handloom weaver might all conceivably be given the working class label. Further, the definition and operationalisation of the concept of class provide many difficulties; for instance, during the nineteenth century, especially the early part, the division between artisans or skilled workers and the semi-skilled or unskilled members of the labour force was as great, if not greater than, the split between the working and the middle classes.³⁴ For these reasons, I believe that social class would not provide a sound base on which to set the micro-level study of family formation in the nineteenth century.

Turning to the possible usage of a geographic locality as a unit of study, it is immediately apparent that this too would have obscured certain demographic patterns, since once again too many dissimilar occupational groups would have been brought together. However, recognition is given to the fact that demographic behaviour may be affected not only by occupationally related factors but also by specific influences rooted in the locality. For example, a local custom may exist which greatly encourages early marriage and if this were widespread, then it could perhaps become established as a normal or culturally patterned form of behaviour. Moreover, the origin of such a custom may lie wholly outwith any occupational framework. (A systematic attempt to examine this potential locality effect will be made throughout the present thesis and the particular format will be discussed towards the end of this chapter.)

Having considered social classes, geographic localities and occupational groups as analytic units, it would seem that the latter provide the most useful micro-level setting in which to study family formation processes. Within the realm of occupations, some groups have already received attention from historical demographers, most notably within heavy industry and textile manufacturing. For example, Wrigley has looked at industrial development and population growth in the north-western coalfield areas of Europe;³⁵ Haines has studied mining and metallurgical populations in England and Wales and also in Pennsylvania's anthracite region;³⁶ and Friedlander has compared coal mining and rural districts in Britain.³⁷ In textiles, Anderson has studied the Lancashire cotton manufacturing

districts;³⁸ Levine has focused on framework knitters in Leicestershire and Nottinghamshire;³⁹ and Tilly and Scott have encompassed both forms of employment in their work on two French industrial cities.⁴⁰

Heavy Industries

Where the heavy industries formed the predominant means of employment, fertility has been found to be high, the age at first marriage has been seen to occur early and in general a larger proportion of the population (especially women) has in fact become married. The reasons behind these particular trends are seen as firmly rooted in the nature of the predominant local occupation. For instance, throughout the nineteenth century, heavy industry was one of the major expanding sectors of the economy and as such, areas where this form of employment was concentrated became centres for the exodus of labour from the rural setting (in turn caused by changes in the organisation of agriculture). Heavy industry required its workforce to be young and strong and consequently areas where coal mining or metallurgy were predominant became the focus for a process of selective in-migration of males in the age groups 15-19 and 20-24. This in turn affected the balance of the sex ratios in these age groups and in the local population as a whole, subsequently providing one reason behind an increased likelihood of marriage for the young, local, female population.⁴¹

In terms of the actual work in coal or ironstone mining, iron manufacture and shipbuilding, much of it was strictly the reserve of a male workforce and with the increasing introduction of legislation

to prevent women from entering this type of employment, it is safe to say that by the 1860s there were few opportunities within the heavy industries for women's work.⁴² Moreover, in geographic areas dominated by heavy industrial work, there were altogether few opportunities for female labour-force participation outside the home. Positions which sometimes did exist for women, for instance in domestic service or as shop assistants, did not offer a particularly attractive way of life.⁴³ In this way marriage, at as early an age as possible, became just about the only course (other than out-migration into service) left open to a young woman who sought independence from her own family. Bell, describing the girls of Middlesborough in the 1890s, states that "they mostly marry very young; the conditions of the town point to their doing so".⁴⁴ The distinct lack of job opportunities for women is therefore seen as a further factor in the observed low female age at marriage in areas or towns where heavy industries are predominant.

The nature of the employment in localities where heavy industrial processes were carried out may in some way or other have affected the age at which males married as well, since it has been found that a lower age at first marriage for men also tended to exist in these areas.⁴⁵ The work in these industries was mainly dependent upon physical strength, with the ability to attain the necessary skills coming relatively fast and as a result, the peak of a worker's earning capacity was achieved at a much earlier age than if he were, say, a journeyman tailor. This then opened up the possibility of earlier marriage for these young, male workers.

Turning to fertility, the higher levels observed in areas of heavy industry may be explained in part by the low age at marriage, which consequently extended the length of the reproductive span falling within marriage. However, occupational characteristics may also have played an important part in determining fertility. For example, the comparatively high wages paid to young men in heavy industry coupled with the non-participation by married women in the labour force may have resulted in children being perceived in terms of low-cost commodities, in that the earnings of the husband were sufficient to provide the necessary care and family upkeep and the earnings of the wife would not have to be foregone.⁴⁶

Textile Manufacturing

In the same way that heavy industrial areas encouraged the immigration of young males, textile-dominated centres acted like magnets for young females, while simultaneously encouraging some of the locally born males to seek work elsewhere. Whereas in heavy industrial areas the sex ratio was often biased in favour of males, in the textile towns the reverse was overwhelmingly the case and in this situation, many women simply never married.⁴⁷ The availability of jobs for young women, either in the mills and workshops or at home, represented an alternative to early marriage which many may have chosen to take. Marriage in this setting, then, was not the only escape route from one's family of origin. Further, the earnings of the male textileworker were, on average, below that of his counterpart in most sections of heavy industry⁴⁸ and did not therefore constitute such a ready-made platform for marriage and a

family. In terms of the household economy, the wife's earnings were probably of equal importance to those of the husband and consequently where they were removed during periods of childbearing, this would inflict considerable hardship upon the family unit; this can be conceptualised as likely to make children in textile towns not such low-cost commodities as they were in areas of heavy industry.

In conclusion, it would appear that areas of heavy industry and of textile manufacture had quite distinct patterns of nuptiality and fertility. On the other hand, it is worth noting that much of the work referred to operates at a level which precludes the exact study of the demographic behaviour of only those engaged in these particular forms of employment. In contrast, the 1911 Fertility Census of Scotland provides a breakdown by occupational group of the mean number of children per family.

For example, coal and ironstone miners had an average number of children born of 7.01, while those engaged in the manufacture of iron had the lower average of 6.26, although this was still significantly greater than the national figure of 5.82. In distinct contrast, those employed in the various sectors of the textile industry, for instance bleachers, printers, dyers and finishers had a mean figure of 5.75 children ever born, those engaged in cotton manufacture were put at 5.62 and those workers involved in wool and worsted manufacture had the very low average of 5.14 births.⁴⁹

Iron and Textile Manufacture

It has already been stated that one of the central concerns of the thesis is the examination of possible family limitation in Scotland in the second half of the nineteenth century.⁵⁰ More specifically, an attempt will be made to compare the patterns of fertility exhibited by two occupationally distinct groups of workers, namely ironworkers and textileworkers. In many ways these two sectors of employment offer rich comparative material, in that they seem to occupy positions at opposite ends of the demographic spectrum, producing differentials in, for example, the proportions marrying, the age of marriage and the number of children ever born. In addition, those working in textiles are generally regarded as 'pioneers' in relation to changes in reproductive behaviour, whereas workers in iron manufacture are not.⁵¹ In this way it will be possible to compare any similarities and any differences which are observed in the nuptiality and fertility patterns for those workers who in the 1860s, the 1870s and the 1880s might have been expected to limit their family size, in contrast with those workers for whom this was not a recognised form of behaviour. Let us now explore some other reasons for selecting these two occupational groups.

Within the heavy industries, coal mining has received most attention in historical demography⁵² and although one major study includes metallurgy, no attempt is made to differentiate between these distinct forms of employment.⁵³ It therefore seemed both justifiable and necessary to conduct a separate study of those engaged in the production of iron.

Within the literature, the textile industry has already been set up as a foil for the study of the demographic patterns exhibited by the heavy industries for the simple reason, stated earlier, that it represents a point at the opposite end of the demographic continuum.⁵⁴ However, in the same manner as there are different occupational groupings within the heavy industries, so too are there various branches making up the textile trade. Cotton and jute manufacture, framework knitting and the production of woollens are all sections of textile manufacture which have already been covered by historical demographers.⁵⁵ In line with the decision to study a different and yet distinct occupation within the heavy industrial sector, a Scottish framework knitting centre was chosen from the range of textile manufacturing.⁵⁶

Shadow Effect

In order to incorporate a study of locality effects upon patterns of demographic behaviour, it was decided to investigate two groups of workers, one from each geographic area, who were involved in neither iron nor textile manufacture, in the manner of a control group. If, for example, there were significant differences in the observed patterns of nuptiality and fertility between, say, ironworkers and those from the same area but not engaged in iron manufacture, then this would tend to indicate that certain occupational factors related to the manufacture of iron were in some way responsible. In designing the present study, recognition was given to the possibility that the dominant local industry might also affect certain of the life decisions made by those workers who were not

directly connected to that industry.⁵⁷ In other words, there may be a spillover or shadow effect, whereby the marriage or childbearing patterns exhibited by members of the predominant industry's workforce are emulated by other local workers.

Exactly how the mechanism may work will be discussed later⁵⁸ but for now one example will be sufficient. Looked at in terms of competition within the market, if men in the dominant industry were seen to be marrying young brides, then it seems likely that those in other forms of work would have felt a need to bring forward their own marital plans, lest they were to find themselves squeezed out of the running. This example may perhaps seem somewhat extreme or altogether too rational; however, in practical terms, it is not too difficult to imagine a situation where, say a young, single carter, living surrounded by married iron moulders, of a similar age if not younger, may have begun to feel some pressure bearing down upon his concept of manhood, or independence, or whatever, and consequently have found himself wanting to be married, even if financially he was not as yet fully capable of supporting a wife and family. On the other hand, this shadow effect or reference group pressure will not have been experienced by everyone, as indicated by the long tail on the nineteenth century age at first marriage distribution.⁵⁹

Conclusion

This chapter has established the need for a micro-level study of the demographic processes involved in family formation, since it has been argued that only data at the micro-level can successfully fulfil the requirements for such measurements as the age at first

marriage, age-specific fertility or the existence of family limitation. Further, it has been argued that a cluster of socio-economic variables will, in all likelihood, influence nuptiality and fertility behaviour and moreover that certain occupations will exhibit particular forms of demographic behaviour as a result of particular combinations of social and economic factors. The present research has therefore been designed to examine, at a micro-level, the similarities and differences between two distinct occupational groups.

Chapter Two will concern itself with methodological issues and will also give justification for the choice of Falkirk and Hawick as the two towns in the study. In Chapter Three a certain amount of social, economic and demographic background for the two Scottish towns will be provided and then in Chapter Four many of the theoretical threads touched upon in this introductory chapter will be taken up again in greater detail.

Chapter Five will begin the investigation of family formation processes operated by the iron and textile workers, together with an exploration of the shadow effect, where the dominant industry may have also influenced the behaviour of those local people who were not in its employment. In Chapter Six certain aspects of illegitimacy and pre-marital pregnancy will be discussed and then in Chapter Seven the theme of family formation will be returned to and more sophisticated techniques, like age-specific marital fertility rates, will be utilised in order to trace patterns of childbearing across the life-cycle. Chapter Eight will attempt to provide some information concerning demographic change over time, through the use

of earlier data contained within the 1855 civil registration schedules and finally, Chapter Nine will draw out explanations for the similarities and differentials in the observed marital and fertility strategies.

Chapter Two

METHODOLOGICAL ISSUES

Introduction

In this chapter certain methodological issues relevant to the present research design will be discussed and in particular, mention will be made of the rationale behind the selection of both the specific time period and the geographic localities to be investigated, together with a detailed presentation of the manner in which the census and civil registration linkage was achieved.

The design of any piece of research is crucially important and acts to determine not just the areas which can fruitfully be studied, but also the scope of the suggestions and conclusions which may be posited at the end of the analysis. This thesis has undertaken to study the patterns of nuptiality and fertility exhibited by two distinct groups of industrial workers, although the research design will inevitably affect the relative standing of the various areas of interest in terms of their emphasis. In this way certain problems which were originally of primary concern have had to be demoted in status as it proved impossible to include wholly adequate means for their study within the overall project design. At the same time, it was discovered during the course of the research that the particular design chosen was possibly more suitable for a detailed comparison of the fertility patterns exhibited by the various groups themselves, as opposed to a straightforward investigation of differentials in the rates of decline. It is therefore with these and other methodological issues that this chapter will be concerned.

Originally the primary intention of the thesis was to connect up the decision to marry and the subsequent patterns of childbearing with the actual earnings attributable to each family unit. Standard of living surveillance of this nature, at the level of the individual, has only been attempted in the family survey of Breslau in Germany in 1905, where the average number of children born per marriage was cross-tabulated with the amount of rent payable, on the basis that the level of rent would serve as an index of the standard of living.¹

In the case of this thesis, it had been intended that wages books would be used to provide a detailed source of financial information regarding the economy of households, although it was recognised that long runs of wages data for Scottish businesses were the exception rather than the rule, due to the manner in which labour was hired and administered, as opposed to any deliberate attempt to draw a cloak over the payment of low wages. For example it was common for a skilled worker to pay for his own labourer² and in shipbuilding, the usual practice was for the company to pay a foreman who then both recruited and paid the men who did the work.³

There is some evidence that this latter practice occurred within the iron industry, since in 1824 iron moulders in Glasgow gave notice of their intention to strike over the operation of the Hagman system, in which a foreman working on sub-contract to the foundry masters hired and paid his own moulders⁴ and although the strike threat was successful, certain cases still persisted as late as the 1880s.⁵

Previous to my own research, only three sets of surviving and long

running wage books had been discovered for nineteenth century Scotland; those pertaining to Dixon's Colliery near Glasgow, the Cowan Paper Company in Penicuik and the Ballantyne Woollen Mills at Walkerburn and Galashiels.⁶ It was therefore of major significance when the Carron Company near Falkirk was found to possess wages information for certain decades in the second half of the nineteenth century. However, following long negotiations over access, it was discovered that a 'Salary and Wages Book 1871-1882'⁷ was in reality only a record of payments to a very few salaried workers. Added to which it was further deduced that a 'Wages Book 1879-1896'⁸ for Carron, held by the Scottish Records Office, was in fact probably a Company Loans book but certainly not a record of wages.⁹

Thus the original intention of linking wages records from Carron with the demographic profiles of the workforce gained from the census and civil registration schedules, had to be sacrificed. Included in this original research design was to have been a similar linking of information from Walkerburn using the wages information from Ballantyne's Mills and this too was now removed as there would have been no parallel group for comparison.

The Towns

Despite the enforced relegation of the detailed economic angle from the research design, the town of Falkirk still remained an ideal locality as it was rich in the necessary raw materials, that is, ironworkers. As well as having the renowned Carron Iron Works, situated just to the north, the town also played host to a number of other foundries and forges, chief of which was the Falkirk Iron

Works founded in 1819 by some of the workers from Carron.¹⁰ In 1850 Falkirk and its environs only had two major foundries, although by 1877 this figure had increased to sixteen¹¹ and by 1880 twenty one foundries were providing employment for over six thousand men and boys.¹²

This study does not represent an exploration of the patterns of nuptiality and fertility relating to the Carron Company's workforce, since many of the individual workers dealt with were undoubtedly employed in the other iron works in and around Falkirk. On the other hand, the wealth of information concerning Carron which appears in the literature, can still be put to good use, since there is considerable evidence that the other iron works in Falkirk, following the example of their more illustrious neighbour, produced mainly light castings;¹³ in this case the same fluctuations in trade were likely to have affected the ironworkers of Falkirk irrespective of their place of employment.

From a theoretical standpoint, it had already been decided to use the textile industry for comparative purposes and initially the small town of Walkerburn had been selected due solely to the availability of wages data. However, with the wages angle no longer a prerequisite, it was deemed prudent to use somewhere larger and preferably of the same population size as Falkirk, whilst simultaneously representing something interesting within its own right. For these reasons, the town of Hawick in Scotland's border region was finally decided upon as it was approximately the same size as the iron town and, more importantly, it was dominated by hosiery and woollen manufacture, carried out in the main by wool

framework knitters.

In Hawick many of the frames were housed in small workshops, which was unusual for the trade as a whole and had the effect of bringing workers together in centralised workplaces. On the other hand, the domestic mode of production still persisted in certain instances and there were widespread opportunities for married women and young children to engage in paid work in the home. In this way, then, the selection of Hawick represented a comparative tool in the analysis of the nuptiality and fertility patterns exhibited by those workers in the iron town and at the same time opened up the possibility of interesting comparisons with other textile areas where different methods of work organisation were in operation.¹⁴

A further reason underpinning the choice of both Falkirk and Hawick was the well-established nature of their occupational structures in evidence by the second half of the nineteenth century. For example, the Carron Company had been founded as early as 1759, the Falkirk Iron Works had begun production in 1815 and the stocking frame had first been introduced to Hawick in 1771. If one of the underlying concerns of the thesis was the potential effects of a particular set of characteristics associated with a specific occupation on the ensuing demographic behaviour not only of those employed in that occupation but also in the area as a whole, then it was of primary importance to undertake a study of localities where the occupational structure was both stable and of some years' duration. This then creates the opportunity for discussing not simply the domination of local economies by certain industries but also the concomitant domination of men's minds.

1871 Census

Originally the major emphasis within the thesis was to have been certain aspects of the decline in fertility taking place in Britain towards the end of the nineteenth century, with the investigation focusing on any specifically Scottish patterns of decline which could be associated with both different occupations and also different levels of earning within occupations. Although the investigation relating to differences in standard of living had to be put aside due to the lack of wages records, the planned emphasis on aspects of the fertility decline continued to dominate the design stage and it was not until the analysis stage began that the focus started to shift towards an in-depth exploration of the differentials exhibited by the distinct occupational groups in terms of their marriage and childbearing strategies. Gaining an insight into reproductive behaviour at a time of declining fertility therefore determined the manner in which the initial samples were selected.

According to the literature, the decline in fertility in Britain is estimated as being under way by the 1870s and consequently this formed the period of interest for the thesis. The research design had therefore to be capable of spanning both the 1870s and beyond, whilst at the same time operating within the constraints imposed by the availability of demographic data. For example, the census enumerators' books in Scotland are open to scrutiny from 1841 up to and including 1891 and although access to civil registration documents may be arranged for after 1891, it was necessary for this thesis to use the census as a back-up system and safeguard against

error.¹⁵

In Scotland in 1871 the mean age at first marriage for women was twenty five years of age, which consequently entailed a potential span of twenty years of legitimate childbearing. As a result, the census year of 1871 was decided upon to provide the initial samples of recently formed family units, since this would encompass the beginning of the period of the fertility decline and the ensuing twenty year period of reproduction could be covered by the available census data.

Every young married couple was systematically extracted from the 1871 enumerators' books for Falkirk¹⁶ and Hawick, where a 'young married couple' was defined as one where the wife was thirty years of age or less and although the husband's age was not subjected to any control, there was a large degree of correspondence between the ages of both parties. In general, identification of married couples caused no problems, but in marginal cases, it was assumed that a couple were married if co-residence existed of two 'married persons' and if similar surnames were declared.

The assumption inherent in taking thirty years of age as the upper limit was that by 1871 the duration of most marriages would not have been in excess of ten years. There were three reasons for the placing of this restriction: firstly, it would only entail ten years of retrospective searching in birth registers to either complete or confirm reproductive histories; secondly, the inclusion of older wives would have meant the parallel inclusion of childbearing behaviour relevant to an earlier period; and thirdly,

and connected to the last point, it is wise to maintain categories for analysis which are as pure as possible to limit the number of external factors which must be considered.

It must be pointed out that the research design deliberately excluded those who married after the age of thirty and therefore straightforward comparisons with national age of marriage data, for example, are not possible. Furthermore, it should also be recognised that the particular nature of the research design may have introduced a potential bias in the composition of the different groups of workers, in that those marrying early had a greater opportunity to be represented. It must be stated that this problem, together with the full extent of the ensuing ramifications, was only uncovered at a very late stage in the work, immediately prior to the completion of the thesis, and consequently a full discussion of what has emerged as an extremely complicated issue, has been set aside in Appendix B.

As already mentioned, part of the thesis represents an attempt to gain some insight into the possible strength of reference group pressure acting through the shadow effect, whereby the marital and reproductive behaviour of workers in iron and textiles may also have been mirrored by other local workers not directly involved in these industries.¹⁷ To this end, all the young married couples extracted from the 1871 census were divided into ironworkers and non-ironworkers, in the case of Falkirk, and textile workers and non-textile workers, in the case of Hawick.¹⁸

In the actual process of abstracting information from the census enumerators' books, a line of reasoning was followed which saw it as important to possess more information than perhaps the bare minimum. Firstly, the greater the range of data that exists for a specific family group the easier subsequent recognition becomes, and secondly, the extra time and effort required in noting, say, a child's occupation or the presence of a boarder, is more than compensated for by creating the potential for developing the work along alternative lines in the future. Thus, the following data were recorded from the 1871 census schedules: the surname and prename(s) of the husband; the prename(s) of the wife and, if different from that of her husband, the surname; the prenames of any children; each individual's relationship to the household head, together with their ages and occupations; the birth places of all members of the household; and finally the exact address and the enumeration division in which the property was located. This information was then transferred onto six by four inch record cards, each sample being arranged alphabetically in preparation for linking with the birth registers.

Before moving to a discussion of the record linkage, it may be useful at this stage to look at the occupational composition of males in the four sample groups. In the ironwork group, ironmoulders represented nearly 60 per cent of the total, followed by gratefitters with just over 12 per cent and iron dressers with 8 per cent.¹⁹ The textileworkers were more diversified with 31 per cent being described as wool framework knitters, 13 per cent as wool spinners, 12 per cent as wool sorters and a further 12 per cent as

wool warehousemen. Both the non-ironworkers and non-textileworkers were comprised of a complete hotch-potch of different jobs, most of which were either skilled or semi-skilled.²⁰

Throughout the course of their working lives, some men within the sample groups changed jobs, mostly within the same broad occupational grouping but occasionally this took the form of entering a completely different trade. It is interesting to note that the vast majority showed quite a remarkable degree of job immobility and this was particularly true for the ironmoulders. In those cases where a complete change of employment did occur, a number of guidelines were established to enable a decision to be made concerning which group should be the overall beneficiary. For example, if a worker had been employed in iron until reaching his mid-thirties, then he would remain in the iron group, on the grounds that his work experience in the iron industry would have shaped his decision to marry together with his family's early reproductive behaviour. In ideal circumstances in-between workers would be discarded but when total numbers are rather small, recourse to this particular solution is not possible, although fortunately there were relatively few such cases and most were easily resolved.

Census and Birth Register Linkage

The information contained in a census schedule only refers to one particular point in time and as such cannot account for members of the family unit who may either be away from home when the form was completed and collected or who may have been born and subsequently died in the intervening years between two censuses. A sole reliance

on the census would therefore tend to underestimate fertility since infant and child mortality would be missed and the possibility of children being resident elsewhere at the time of the census would similarly be ignored. These same shortcomings are applicable to the utilisation of child-woman ratios, where the initial information is supplied by a census, thus creating a large amount of doubt as to their usefulness. On the other hand, if the census information is checked, added to and expanded through the utilisation of birth registers, then a sound data base is created allowing the detailed study of family formation processes.

Birth registers, along with marriage and death registers, have officially been kept in Scotland since 1855, with each registration district independently compiling annual volumes, alphabetically indexed by the surname and christian names of those born. The requisite information on a birth registration schedule was altered twice within the first six years, but by 1861 a format was established in which the following information had to be entered: the prename and surname of the child; when and where the birth occurred; the sex of the child; name, surname, rank or profession of the father; name and maiden name of the mother; date and place of marriage;²¹ signature and qualification (relationship) of informant; when and where birth was registered; and finally the signature of the local registrar.

In the first instance, the census information taken from the 1871 census was linked to the birth registration data, although once this process was complete a further check was instigated, whereby an attempt was made to locate all the couples from the original samples

in both the 1881 and 1891 censuses. Compared with what might have been expected from earlier studies, a rather large proportion of family units were traced and linked using all four sources, that is the 1871, 1881 and 1891 census schedules and the local birth registers and the relevant data are presented in Table 2.1.

Table 2.1. Percentage of all 1871 couples linked in the 1871, 1881 and 1891 Censuses and Birth Registers

	N	Percentage Linked
Iron	71	47
Non Iron	30	31
Text	50	39
Non Text	46	44

Source: Census/Birth Register Linkage.

This further check comprising the 1881 and 1891 censuses was thought to be necessary since it is in theory possible for a couple to move out of the district in which they were usually resident, stay two or three years elsewhere before returning 'home', having had an extra child in the meantime. In this hypothetical instance, this particular birth could not have been accounted for by one census linkage to birth registers, since birth registers were only searched within each census district. However, by continually linking every available statutory intersection in the life-cycle of the family unit, the possibility of oversight and basic error is greatly minimised, if not totally removed.

It could, of course, be argued that even this thorough method of

inquiry falls down in its inability to cope with the following hypothetical occurrence: a couple having been married in Falkirk and having had one child, move to the neighbouring parish of Bothkennar, have a second child which subsequently dies after six months, whereupon the family returns to Falkirk where they live out the remainder of their lives having more children. In this particular instance, the research design would record a family unit with a long interval between the first and second births, whereas in reality an extra birth should have been recorded. The point is noted more out of strict methodological interest than anything else, since the number of cases of this kind would certainly be very small and moreover would occur randomly, thus having little effect on the overall analysis.

Table 2.2. Proportion of all couples lacking total linkage who were linked between at least some sources

Linkage	Iron	Non Iron	Text	Non Text
1871,1881 + 1891 census	40 (60)	26 (26)	31 (39)	37 (39)
1871 + 1881 or 1891 census	55 (82)	32 (31)	38 (48)	44 (46)
1871 + 1881 or 1891 census but wife/husband widowed	65 (98)	38 (37)	46 (59)	51 (54)
1871 + either birth registers or other census	87 (131)	87 (85)	83 (106)	87 (91)

Source: Census/Birth Register Linkage

Note The actual numbers are given in brackets.

In addition to the family units which were traced across all three census points and throughout the birth registers, certain other linkages were also achieved and the most important of these are given in Table 2.2. It may be observed that all except a few of the young married couples extracted from the 1871 census enumerators' books were linked with at least some demographic information relevant to themselves. Therefore the process of record linkage, whether partial or complete, provides a considerable data base where the various elements may be used for different purposes. For example, while the partially linked family units cannot all be used in the analysis of fertility patterns, they may nevertheless form part of the examination of marriage ages.

Turning now to the actual mechanics of the record linkage, it is worth noting that the complete process was achieved solely by manual means, as the comparatively small number of cases in each of the four sample groups permitted this method of matching. The alphabetical index at the end of every annual birth register was scanned and whenever a surname was located which coincided with that of a family unit from the town in question, that particular entry in the register had to be carefully scrutinised before the birth could either be recorded or rejected.

A number of guidelines were used to judge whether the birth in question could properly be accredited to a particular family unit. Firstly, the surname and prenames of both the father and mother occurring on the birth schedule were compared with the same information appearing on the record cards compiled from the 1871 census enumerators' books and secondly, the occupation of the father

was compared in a similar manner. If all these factors were found to correspond, then the following information was entered on the record cards: the name of the child; the day, month and year of the birth; where the birth occurred; the occupation of the father; the maiden name of the mother; and finally the date and place of the parents' marriage.²²

The process of record linkage involved the systematic searching of the annual birth registers for both Falkirk and Hawick from 1858 to 1895. In the original design the intention had been to limit the period of search to 1861 and 1891; however, it quickly became apparent that some of the youngest married couples in 1871 would still have been eligible to give birth in the early 1890s and consequently, the search period was extended until the likelihood of a further birth had been satisfactorily eliminated.²³ The retrospective search of birth registers prior to 1871 was necessary in order to locate any children born between marriage and the 1871 census. For the majority of couples, marriage occurred in the mid and late 1860s and it was therefore not essential to search as far back as 1858, although, on the other hand, it would have been a mistake to eliminate a married couple immediately their marriage year had been passed as there was always the interesting possibility of locating an illegitimate birth.

Within the workings of this record linkage, there are several minor points which arose but which deserve only limited mention and therefore these shall be dealt with briefly here. Firstly, there was a large degree of conformity and continuity with regard to the

reporting of the father's occupation between the census and the vital registration documents. This was probably aided by the broad nature of the two definitive terms of ironworker and textileworker. Secondly, many discrepancies were found in the reporting of the date of marriage on the birth schedules, with the variation ranging from a few days to ten years. There was, however, no doubt that it was the same marriage which was being 'mis-reported' as great care was taken to ensure that the surname of the husband and the maiden name of the wife, together with the husband's occupation, were all identical. All the discrepancies were noted on the record cards and usually by the end of the record linkage, one particular date had come to be favoured above all others and this was therefore taken as the 'true' marriage data.²⁴ Thirdly, and connected with this last point, a number of cases were encountered where a marriage was variously reported as having taken place on the last day of December or the first day of January, thus translating an initial discrepancy of one year into a matter of a few hours.²⁵

Comparison Over Time: The 1855 Data Base

The original research design with the emphasis on the fertility decline, required information from an earlier time period in order to gauge whether fertility was declining and if so, at what speed the reduction was taking place and who was being most affected. Ideally, detailed reproductive histories similar to those constructed for the 1871 data base were needed in order to compare like with like. However, the most blatant obstacle was the paucity of any primary historical material which even marginally pertained

to this subject. The compulsory registration of births, marriages and deaths only came into force in Scotland in 1855 and prior to this, the old parish registers do not provide either a reliable or a continuous source of demographic information. On the other hand, Scotland does possess a unique set of civil registration schedules for the single year 1855, in that for this the first year of statutory registration, a vast array of demographically useful information had to be entered on every civil registration schedule. In view of the potential importance of the 1855 registers, the contents of each will be described in some detail.

A marriage schedule for 1855 included, amongst other things, the ages, occupations and birth places together with the present and usual addresses of both parties as well as the names and occupations of both sets of parents. In the case of a subsequent marriage, the number of the marriage was stated along with a list of any children from previous unions, those still alive being differentiated from those who had died. In some cases, the ages of the children were given, although the recording of this would appear to be determined by the zeal of the local registrar. Originally, it had been intended to use the remarriage data for women to gain an insight into reproductive behaviour in the early nineteenth century; however, although a woman's age was stated on an 1855 marriage schedule, the ages at which previous marriages were both entered and terminated remained unknown, thus preventing the detailed analysis of marital fertility.

An 1855 death schedule provided a rich source of material relating both to the deceased and to his or her parents.²⁶ If the deceased

had been married, then the name of the spouse was entered along with the names and ages of any children in their birth order, which at first glance would appear to provide an opportunity for tracing a woman's reproductive career. However, there are two main problems with the 1855 death schedules. Firstly, it is possible that any children who either died in infancy or when very young may have been omitted from the father's or mother's death schedule due to deliberate omission of this information, a simple lapse of memory, or lack of knowledge on the part of the person informing the registrar of the death. Secondly, the age of marriage was not stated and consequently an estimate based on the date of the first birth would have had to have been made. In my opinion, there were therefore too many opportunities for the intrusion of error in a research design which included the 1855 death schedule.

In 1855 a birth register entry included both parents' names, their ages, their birthplaces, the father's occupation and the mother's maiden name and moreover when and where their marriage took place, together with the number of children already born and whether they were alive or dead. The last data are by no means perfect as they take the form of a rude head count, for example, '2 boys and 3 girls alive, 2 boys dead', and since no ages are stated, the analysis of reproductive behaviour is certainly restricted. On balance, the 1855 birth schedules offered the greatest amount of reliable information concerning marriage and fertility behaviour from an earlier period in nineteenth century Scotland.

The 1855 birth registers for Falkirk and Hawick were used to create a further data base comprising another four sample groups of

ironworkers and non-ironworkers, textileworkers and non-textileworkers. Only births occurring to married women aged thirty five years or more were extracted for the following reasons: firstly, it was desirable to ensure a comparison with as early a period in the nineteenth century as possible since the 1871 data base spanned the 1860s through to the 1880s; secondly, if the age limit had been increased in an effort to go even further back, then the number of births falling within this design would have been too small; thirdly, if the age restriction had been reduced to thirty or less, than the two distinct data bases would have begun to overlap, since a woman giving birth in 1855 at the age of thirty could quite easily still be fertile throughout the 1860s. Thus, by operating the cut at thirty five years of age, both the criteria of creating sufficient numbers and a distinct, autonomous reproductive period were fulfilled.²⁷

In the case of Falkirk, the total number of males in the 1855 birth registers who were found to be employed in the iron industry and who also had wives of the requisite age, was considered too small and consequently the research design was amended slightly to permit the inclusion of more ironworkers from a neighbouring parish. The birth registers for the three parishes immediately adjacent to Falkirk Burgh, that is Bothkennar, Larbert and Falkirk Landward, were searched and it was discovered that for 1855 in Larbert there were thirty births accredited to wives of thirty five years or more whose husbands were ironworkers.²⁸ Moreover, the parish of Larbert was considered to have a similar industrial base to that of Falkirk Burgh and was consequently appropriate for incorporation into the

study.²⁹ On the other hand, the non-ironworkers were still drawn solely from Falkirk Burgh as their numbers were deemed sufficient and further there was no evidence to suggest that those in this category in Larbert were radically different in terms of their demographic behaviour from those in Falkirk.

Turning to the mechanics of constructing the 1855 data base, much the same method was employed as with the 1871 information, whereby the initial material from the 1855 birth registers was transferred onto six by four inch record cards and in order to complete the reproductive biographies the annual birth registers for Falkirk, Larbert and Hawick were searched from 1856 through to 1868.³⁰ Although the 1855 data base is less comprehensive than its 1871 counterpart (for instance only limited age-specific fertility analysis may be attempted), it is invaluable in that not only can the age of marriage be studied, but the age of the mother at the last birth and in most cases the length of the last birth interval can also be investigated.

However, the major benefit of the research design used in the compilation of both data bases lies in the large degree of comparability which exists, whereby certain aspects of the marriage and fertility behaviour of sample groups of ironworkers and textileworkers together with their control groups can be studied not merely in relation to each other but also across time, albeit for a limited period.

Conclusion

In this chapter the nuts and bolts of the research have been presented and discussed and, despite having been constructed specifically for the study of the fertility decline, the shift in emphasis to a detailed investigation of the differentials in nuptiality and fertility existing between the various groups, can be just as comfortably accommodated within the parameters of the research design. The specific manner in which the data were compiled, and in particular, the 1871 data base, permits a precise analysis of the marriage and reproductive strategies employed by the four groups of workers and their families, without recourse to the estimates, probabilities and hypothetical models which continue to detract from a good deal of present historical demography.

Chapter Three

SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS OF FALKIRK AND HAWICK

Introduction

In this chapter an account will be given of the structure and format of the local economies of both Falkirk and Hawick. A brief history of the development of the iron and textile industries in these two Scottish towns will be presented as background or contextual information before the analysis turns to an examination of employment patterns and work opportunities followed by a consideration of the different wage levels applicable to these industries throughout the second half of the nineteenth century.

Once the occupational analysis is complete, certain aspects of the local demographic structures will then be investigated in order to provide still more contextual data within which the thesis as a whole should be viewed. For example, overall population growth will be presented in combination with migration patterns and the concomitant effects this may have had upon both the sex ratios and the age structures, with the proportions marrying both ultimately and in certain age groups also being studied.

It is important to present this kind of information in any historical demographic study and moreover it must not remain purely as background data but must instead be interwoven with the analysis of, in the case of this thesis, the various strategies for nuptiality and fertility behaviour exhibited by the different groups of workers. Recorded instances of births, marriages and deaths must

not be seen as social facts, which possess an intrinsic meaning within themselves, but rather a place must be reserved within this field of study for an investigation of the social processes and culturally patterned factors which cause, influence, or in some other way affect these critical points in the life-cycle. A study which remains on the quantitative plain should only indicate what patterns of demographic behaviour were occurring in a particular population at a particular time, since it cannot begin to explain why these patterns were exhibited in preference to other alternatives, unless the realm of speculation is employed. Officially recorded critical life events, such as births or marriages, exist in civil registration schedules each in the form of an abstraction from the overall life of a particular individual and in order to properly understand one specific element in that life, knowledge of the totality is required in tandem with information relating to that individual's circumstances and living environment.

For example, one birth accredited to a couple is little more than meaningless unless seen in the context of their overall reproductive history and in terms of the changing nature of their particular household economy. If meaning and causality are to be injected into an analysis of population patterns in the past, then it is imperative that information be brought to light which bears directly upon the circumstances under which a family unit firstly came into being and secondly reproduced itself. It is toward this end that this chapter must work.

LOCAL ECONOMIES

In the first instance, the economic environments of Falkirk and then Hawick will be presented, mainly in terms of their industrial development and their male occupational structures. This will subsequently be followed by a discussion of the particular employment opportunities for women and then for children, with two final sections set aside for the exploration of wage levels and the availability of housing.

Falkirk : The Iron Town

The manufacture of iron dominated the town of Falkirk throughout the nineteenth century and had been of major significance in the area from as early as the 1770s. By this time the Carron Company, founded in 1759, had established a reputation as one of the chief munitions works in Europe,¹ due primarily to the production of the carronade,² a short quick-firing gun of limited range but substantial calibre, especially designed for mounting on merchant ships.³ However, Carron also produced a range of domestic and agricultural goods (for example stoves, grates, kettles, pots, spades and hoes) and this section of the market became increasingly important following the cessation of hostilities with the French in 1815.⁴ The other iron works in and around Falkirk concentrated almost exclusively on the non-military market, producing a range of items from iron girders for bridges to ornamental inkstands.⁵

Turning for a moment to the national picture as regards the Scottish iron industry, it is apparent from the literature that by the end of

the first half of the nineteenth century, a period of rapid expansion was under way. Between 1830 and 1844 the number of blast furnaces increased from twenty seven to one hundred and the output of pig iron rose in corresponding fashion from 37,500 tons to over 400,000 tons,⁶ so that by the mid 1840s the production of pig iron in Scotland represented one quarter of the total British output, as compared with just 5 per cent in 1828.⁷ This position was maintained over the next two decades with output continuing to rise until 1870, the record year for Scottish pig iron production when 1,200,000 tons were produced.⁸

The hub of the Scottish iron industry was centred in the west, around Glasgow and Coatbridge,⁹ from where much of the pig iron was transported to the iron works and foundries of Falkirk which specialised in making the finished products. Scottish pig iron from the blast furnaces had a high phosphoric content which made it comparatively brittle and consequently the primary means by which it could be shaped was to cast it into moulds, a process accomplished in the foundry. If the finished product would be required to withstand large amounts of pressure, then the pig iron had to be refined in the forge by removing carbon from the pigs to produce malleable or wrought iron.¹⁰ Part of Carron's long-standing success may thus be attributable to the ability to diversify, in that, although ironfounding was a specialisation, the company also had forges capable of producing bar and malleable iron.¹¹

By the second half of the nineteenth century Falkirk had become established as the centre for the light castings sector of the Scottish iron industry,¹² and by 1881 out of a total male workforce

of 4,211, just under 37 per cent were engaged in the manufacture of iron, most of whom were ironmoulders.¹³ Whereas the iron industry as a whole went into a steady decline in Scotland throughout the last thirty years of the nineteenth century, with the period 1870-74 acting as a watershed in the industry's development, there is evidence tht the light castings sector in Falkirk was least affected.¹⁴

From this limited discussion of the development of the iron industry both in Scotland and in particular in Falkirk, it is possible to conclude that throughout successive decades from 1850 to 1870 the industry as a whole was expanding and that the light castings sector located in Falkirk was part of this successful development. The likely effects of this favourable state of affairs on the local workforce in Falkirk are obviously debatable and a discussion of wage levels is ideally required (and is taken up below), but suffice it to say for now that a degree of optimism seems likely to have existed in the iron town at this time.

Hawick : The Textile Town

Throughout the nineteenth century the Scottish woollen industry enjoyed considerable success, mainly due to its specialised role in the field of high quality tweeds, hosiery and carpets.¹⁵ Within Scotland the borders region was renowned for its tweed production, although the town of Hawick in particular was first and foremost a centre for hosiery manufacture.¹⁶ In 1771 four stocking frames were introduced into Hawick and by 1844, when the trade was at its peak, this figure had increased to 1,200.¹⁷ By the 1860s a contemporary

stated that there were 800 manually operated stocking frames and only about 90 power-driven and rotary frames,¹⁸ with half the production concentrating on hose and the other half on making shirts, vests, drawers and other items of underclothing.¹⁹

By the early decades of the last century, Hawick had established itself as the predominant framework knitting centre in Scotland, although the local economy also included some carpet making, some spinning and a certain amount of weaving. In the case of the latter, the first power looms were set up in Hawick in 1830 and by the 1860s there were 270 power looms engaged in tweed manufacture together with about 100 hand-operated looms.²⁰ According to the occupational information presented in the 1881 census, 40 per cent of the male workforce were engaged in textile manufacturing and 47 per cent of women of working age formally participated in the labour market, with the vast majority being employed in various branches of the textile trade.

For Britain as a whole, the production of hose on hand-operated stocking frames was a localised industry carried out in the domestic setting and was confined to Leicestershire, Nottinghamshire and Derbyshire in England²¹ and to the towns of Hawick and Dumfries in Scotland.²² Framework knitting was organised around the domestic mode of production as late as the 1850s,²³ although in certain places, most notably Hawick, the factory system was in operation by the early 1840s, whereby a number of frames were assembled in small workshops.²⁴ This almost unique characteristic of the work organisation in Hawick is crucially important for the thesis as a

whole, although it is desperately unfortunate that little detailed information regarding this topic has been uncovered. For example, it would have been invaluable to know when this system was first established, how many workshops of this kind there were and how many frames were contained within each workshop.

The three biggest evils associated with framework knitting were the system of frame renting, the existence of bagmen or middlemen and an unregulated system of apprenticeship.²⁵ The two former elements acted to squeeze the maximum amount of profit from each knitter and the third created a supply of workers which far exceeded the demand. However, it is important to recognise that the Scottish framework knitting trade was different from that located in England, where the competitiveness of the product was essential, in that it was the quality end of the market which was served by the Hawick hosiers and consequently the manually operated frame remained an economic viability as the finished products attracted higher prices.²⁶

This rather unique position of the Hawick textile industry is therefore worth stressing, as the individual experience of the local framework knitters will have been, in all likelihood, radically different from that which influenced their colleagues in the trade south of the border. The work organisation in Hawick was, by the early 1840s, comprised of components from both the factory system and the domestic mode of production, in that some of the frames were congregated in small workshops while others were contained within the worker's own home. Added to this, certain parts of the various manufacturing processes involved in textiles could also be carried out in the domestic setting without any need for machinery or

adherence to set hours and consequently this provided opportunities for work for married women and young children.

The town of Hawick, as a location for the study of nuptiality and fertility patterns, therefore offers many theoretically interesting features and as such, careful consideration must be continuously given to each of the sources of potential influence when analysing its processes of family formation. Let us now consider the particular issue of female labour-force participation within the iron and textile town.

Employment of Women

The availability of employment for women has been put forward as an important determinant both of the proportion of women who ultimately marry and also of ensuing fertility.²⁷ It is important too to distinguish between work opportunities available to single women and those which are accessible to women once married, as in some cases marriage and continued work were incompatible in the nineteenth century. However, the major obstacle in any investigation of female labour-force participation in the last century, as well as today, is that a large amount of casual or undeclared employment remained concealed.

For example, in the data bases compiled for the present thesis, an occupation was only ever given for a married woman in a handful of cases, mostly in Hawick, although without a doubt many wives will have indulged in some form of paid work at one time or another. The occupational breakdown of the workforce provided in the 1881 census

does not differentiate between married and unmarried women, so the only insight which may be glimpsed into the world of women's work is restricted to a description of the major opportunities available, together with the proportions of women of working age in each category of work.

According to the 1881 census, the potential female workforce in Falkirk, defined as the total number of women at all ages, less those described as 'scholars and children of no stated occupation', was comprised of 3,991 individuals, of which only 28 per cent were officially recorded as employed. Of this total female workforce (1,117 individuals), 37 per cent were indoor domestic servants, 19 per cent were dressmakers or seamstresses and 10 per cent were involved in some way with food preparation or lodgings (although the latter category would almost certainly not include those households where one or possibly two boarders were resident). The remainder were scattered across a wide range of miscellaneous occupations.

For Hawick the potential female labour force calculated in the same manner and from the same source was 5,747, of which 2,707 or 47 per cent were reported as being in employment. In this case, indoor domestic servants only comprised 12 per cent of the overall female workforce, being completely overshadowed by the work opportunities available in textile manufacturing and especially in the production of woollen cloth where 57 per cent of women's jobs were located. A straightforward comparison of the availability of women's work in the two towns therefore indicates that in the textile centre of Hawick there was in 1881 a much greater likelihood of a woman being officially recorded as employed, with almost one half of women in

this position as compared with just over one quarter in the iron town.

So who were the women workers in Hawick? As already stated, the 1881 data fails to differentiate between married and single workers, although some age breakdowns are provided. It is therefore worth noting that out of the large number of women engaged in woollen cloth manufacture (1,542), 63 per cent fell within the age grouping 15-25 and with a further 10 per cent occurring in the 5-15 age range, this form of employment can be safely described as predominantly served by younger women. This information will be of importance when the proportions marrying at different ages are discussed later in this chapter and when the age of marriage is considered in Chapter Five.

To sum up, there is little detailed information available regarding women's work for either Falkirk or Hawick in the nineteenth century and consequently much of the analysis of this subject must remain at the level of suggestion and probability. Even the secondary historical accounts cannot provide much of the flavour or atmosphere of women's employment and generally mention is limited to passing observations or uninformative asides. For example, Robson refers to the availability of work for women in the winding of yarn or the sewing up of unfinished garments, without saying who the women might have been or where the work may have been carried out. Obviously both elements would be extremely relevant for the present study.



Employment of Children

In the same way as the availability of employment for women has been suggested as potentially affecting patterns of nuptiality and fertility, similar opportunities for children's work may also have played a part in determining the timing of marriage and the subsequent levels of childbearing.²⁸ For example, the widespread availability of employment for young children under fifteen years old might have acted to encourage early marriage and high fertility, or at least it would not have represented a disincentive, since the relevant child costs would consequently have been relatively low.

However, as with the realm of women's work, it is exceptionally difficult to describe the employment patterns of children in either of the two Scottish towns with any degree of certainty, due primarily to the lack of any sound quantitative material, since once again the only available primary sources are the occupational tables in the 1881 census.

In the iron town of Falkirk in 1881 only 2.6 per cent of the total workforce²⁹ were under fifteen years as compared with 4.1 per cent in Hawick. In Falkirk 3.9 per cent of the male workers were under the age of fifteen, whereas only 1.2 per cent of the female workforce were below this age. In contrast, in Hawick males and females under fifteen years represented 4.5 per cent and 3.7 per cent of their respective labour forces. Therefore child employment was more widespread in the textile town, due mainly to a larger proportion of work opportunities for young girls.

In the iron town young boys who worked were predominantly engaged in

iron manufacture and the few young girls in the workforce were mostly employed in domestic service. In Hawick, the overwhelming majority of boys and girls reported as in employment were engaged in woollen cloth manufacture. However, the fundamental drawback of this kind of data lies in its inability to provide an understanding of either the nature of the work undertaken by child workers or the exact location of the work. It therefore becomes necessary to utilise certain basic historical texts, which have a more general relevance than the particular settings of Falkirk and Hawick, but which represent the only remaining option if anything at all is to be said about child employment. Thus the emphasis on the particular is temporarily lost and it should be pointed out that the following information on children's work is of a general nature.

Evidence relating to the employment of very young children in iron manufacturing suggests that the practice was not common, with the 1851 census for England and Wales indicating that out of 80,000 foundry workers only 180 were boys under ten years of age, although 6,330 workers were reported as falling in the age range 10-15.³⁰ In Scotland, the 1842 Children's Employment Commission reported that at Carron there were 84 boys under the age of thirteen and 185 boys between the ages of thirteen and eighteen out of a total male workforce of 1,024.³¹ By the 1840s Scottish ironmoulders had a fairly nominal period of seven years apprenticeship with a boy usually starting to work between twelve and fourteen years of age.³²

Turning to textile manufacturing, certain of the statutory regulations incorporated into the Factory Acts of the 1840s and 1850s stated that it was no longer permissible to employ children

under the age of ten years.³³ However, the handframe workers in Hawick, despite the concentration in small workshops, did not come under the jurisdiction of these Acts and consequently neither the age of workers nor the length of the working day was officially regulated.³⁴ Small workshops did not become regulated by statute until the late 1860s and early 1870s and even then the inspectorate system was poor and the number of workshops was high, allowing opportunities for older systems of work to continue.³⁵

By the middle of the nineteenth century, the apprenticeship system within hosiery manufacture was in disarray thus creating "a trade grievously overloaded with labourers",³⁶ due primarily to the speed with which it was possible to learn the requisite skills, which in turn made it accessible to virtually anyone.³⁷ Originally an apprentice had begun to work the frame at ten years of age, which created a ready supply of cheap labour for the bagmen and the hosiers.³⁸

There is evidence that as late as the 1860s within both hosiery and woollen cloth manufacture, children as young as four or five years of age were put to work seaming stockings or stitching gloves, tasks which could easily be accomplished within the domestic setting.³⁹ In the workshops, yarn needed to be wound ready for the framework knitters and since the work was unskilled, it could be performed by young children, usually boys who began work at about eight years of age.⁴⁰

From this brief review of child employment patterns, it is now possible to view the situation which pertained in Hawick as

presenting a totally different system of work opportunities. Whereas in the iron town employment for children was generally restricted to boys aged about twelve and over, in the textile town there were opportunities for both boys and girls to work and moreover they could begin at a much younger age. Consequently, children in the iron town would tend to have been dependent upon their parents for longer than was the case in Hawick, thus introducing a discrepancy into the analysis in terms of relative child costs. The effects that employment opportunities for young children may have had on particular aspects of the perceptual apparatus of prospective childbearers remains a matter for speculation, although it would be reasonable to suggest that the availability of children's work may have acted either to encourage larger families or discourage attempts not to have larger families.

Wages

Attempting to identify the level of real wages in the nineteenth century, that is the calculation of actual earnings as set against price changes and the overall cost of living, is an extremely complex matter, often made impossible by the paucity of relevant information. In addition, a detailed individual picture could only be assembled if we knew about, on the one hand, periods of sickness and unemployment and deductions for such things as tools or lateness and on the other, about patterns of expenditure. From the point of view of the present research, three further problems are associated with the assessment of reliable wage information: firstly, regional variations often existed in the money paid to workers within the

same industry; secondly, the price of foodstuffs and other household items as well as rent for housing were liable to similar variations; and thirdly, earnings did not remain fixed across an individual's complete working life.

In terms of this study, this last point is probably the most important since in order to gain insights into the relationship between economic factors and family formation processes, the earnings of a worker, if not for the entire family unit, would need to be traced throughout the course of the life cycle. Through such a process we could account for periods of slack at work, temporary unemployment, years of high, low and average income and subsequently coordinate this material with, for example, the timing of births. However, as detailed in Chapter Two, continuous sets of wage data are extremely rare for the last century and therefore recourse has had to be made to more general indices of the economic climates in both Falkirk and Hawick.

Looking first at the iron industry, it is generally agreed that wages tended to follow the state of the trade itself, whereby the market price for iron, influenced as it was by depression and periods of inflation, directly affected the level at which wages were paid.⁴¹ In general then, the wages of ironworkers in Falkirk followed a pattern which saw a gradual rise from 24 shillings in the 1840s to 28 shillings in 1855.⁴² Throughout the 1860s the wage varied from between 26 shillings to 30 shillings for a week's work,⁴³ although one source puts it as low as 25 shillings in the later years of that decade.⁴⁴

During the boom years of the early 1870s, an average wage of 30 shillings had been consolidated despite the fact that this was to be eaten away over the next five or six years as a direct result of a downturn in the shipbuilding industry.⁴⁵ However, by the beginning of the 1870s, the cost of living had definitely increased, although it has been suggested that real wages did stay marginally higher. Moreover, by this time overtime rates had been established and consequently take-home pay was greater in the 1870s as compared with thirty years before.⁴⁶ Finally, by the early 1880s between 31 shillings and 34 shillings could now be expected for a week's work in Falkirk's iron industry.

It should be pointed out that the wage data quoted refers to ironmoulders who in fact comprised a majority of the industry's work force in Falkirk. The moulding of iron was a skilled trade and as such commanded relatively high wages, so that on average a moulder received 20 per cent extra in his pay packet than a smith in the foundry and 60 per cent more than a labourer in the works.⁴⁷ On the other hand, a puddler of iron, one of the aristocracy of the proletariat and a worker who fulfilled a task described as the 'severest kind of labour voluntarily undertaken by man',⁴⁸ was paid around 8 shillings a day in the 1860s, part of which it was said, was to pay for the vast quantities of beer needed to slake the raging thirst caused by the nature of the work.⁴⁹

Moving to the textile town of Hawick, it would appear that earnings were less than those applicable within the iron industry in Falkirk. In 1867 workers on the older narrow frames were being paid between 13 and 14 shillings for their week's work.⁵⁰ On the whole, the

trend in wages for the Borders' textile industry was upward from around the 1830s to the mid 1880s, with the major increases being confined to the period following 1850.⁵¹ The cost of living increased in a similar fashion to Falkirk, whereby real wages usually managed to improve.

In terms of a comparison between the wage levels in the two Scottish towns, it is apparent from the evidence that an ironmoulder in the 1860s was probably earning between 45 and 50 per cent more than a wool framework knitter. Moreover, it is generally recognised that at this time wages in the heavy industries of mining and iron manufacture were higher than the national average and undoubtedly greater than those received by textile workers.⁵²

However, a detailed comparison of the standards of living enjoyed in each of the Scottish towns is beyond what the data will allow. For example, the internal variations within each industry were likely to have been considerable since ironworkers in the light castings foundries around Falkirk were paid according to piece rates, as were some of the wool framework knitters in Hawick. Moreover, in the textile town some workers were located in small workshops whilst certain others maintained the domestic mode of production and therefore in all likelihood there were differences in the wage levels within both the iron and the textile industries in Falkirk and Hawick.

The most important difference between the groups of iron and textile workers was in all likelihood in the area of family wages. For instance, where female labour-force participation was a reality for

married women, then there was the potential for the family wage to be pushed up in cases where both partners were employed. Therefore, although men's earnings in the iron industry were higher than those in textiles, the greater availability of women's work in the latter industry will have meant that in some cases the overall family wage within textile areas will have been equal to if not greater than that attainable in iron dominated areas. On the other hand, paid work for married women in textiles would have been intermittent as it would have been affected by childbearing and child care.

Housing

Finally, in this half of the chapter, let us consider the availability of housing in both the Scottish towns, since this may have had important side-effects, particularly in relation to the age of marriage. If the supply of suitable accommodation for young married couples was plentiful, then at least this would not have represented a disincentive to early marriage.

In Falkirk many houses were rebuilt and modernised during the first half of the nineteenth century and in the period 1840-80 many others were constructed in order to accommodate the growing population.⁵³ As in coal mining, a system of tied housing was common within the iron industry, whereby accommodation was provided by the company either as part of the wage or with direct rent deduction before the wages were paid to the worker.⁵⁴ In this way then the Carron Company owned much of the property in the villages around Falkirk, some of which came within the confines of the town itself.⁵⁵

Turning to the textile town of Hawick, many of the older tenements with their thatched roofs had either been demolished or modernised by the 1840s and at this time accommodation was adequate for the needs of the local population.⁵⁶ However, by the 1860s, the picture was changing. In the town centre overcrowding had become a serious problem with narrow wynds and closes housing many families, some only in garrets and cellars. Conditions have been described as "grossly insanitary and dilapidated", encouraging disease and creating very high mortality rates among young children and infants.⁵⁷ It was reported in 1862 that there were around one hundred houses in Hawick where two or more families were living in single rooms, giving rise to "absolutely vile" conditions.⁵⁸

Despite the fact that specific information on housing in both Falkirk and Hawick is very limited, it would appear from the evidence presented that accommodation may have been of a poorer quality and also more difficult to find in the textile town of Hawick.

Summary

In this first half of the chapter, we have provided contextual data regarding a bundle of factors which are commonly held to affect both nuptiality and fertility. The local economies in both Scottish towns were seen to be expanding and real wages steadily increasing throughout the middle decades of the nineteenth century. Female employment was officially greater in the textile town and although child labour was not recognised to a large degree in either location, a larger proportion of children in Hawick were categorised

as working. In very general terms, the level of male wages and the availability of housing were poorer in the textile town.

This socio-economic data therefore forms a backdrop to the detailed analysis of the demographic behaviour exhibited by the ironworkers and the textile workers to be presented in Chapters Five through to Eight, and it will subsequently be drawn upon in the formation of explanations in Chapter Nine. However, first we must examine certain of the local demographic characteristics, as they apply to both towns as a whole.

LOCAL DEMOGRAPHIC CHARACTERISTICS

Before detailing the specific patterns of nuptiality and fertility pertaining to the iron and textile groups, it would be of value to discuss some of the more general demographic characteristics exhibited by the local populations in Falkirk and Hawick. Once again, this information will provide a useful background for the main study.

Population Size

In line with the industrial expansion described for the two towns in the first half of this chapter, the figures in Table 3.1 indicate that both the local populations almost doubled in size between 1851 and 1891 with the major increase occurring after 1871. Throughout the nineteenth century, certain alterations were made to the parish boundaries, particularly in relation to Hawick, but these were all minor and could not account for the observed population increase.

Table 3.1. Population, By Sex, Falkirk and Hawick, 1851-1891

Year	Falkirk			Hawick		
	Males	Females	Total	Males	Females	Total
1851	4236	4516	8752	3840	3961	7801
1861	4319	4711	9030	4319	4407	8726
1871	4686	4861	9547	4153	4580	8733
1881	6743	6427	13 170	5604	6154	11 758
1891	8647	7973	16,620	6501	7621	14,122

Source: Decennial Censuses of Scotland 1851-1891

Furthermore, it is highly unlikely that the large increase in population size evident in the 1870s, could have been caused by either higher fertility or lower mortality; therefore, we must look closely at the movement of population both in and out of the two towns.

Migration

An examination of the sex ratios for Falkirk and Hawick, given in Table 3.2, shows that there was a move towards a preponderance of males in the iron town, in contrast to the overall predominance of females in the textile town.

Table 3.2. Sex Ratios (Males per 100 Females) Scotland, Falkirk and Hawick

Year	Scotland	Falkirk	Hawick
1851	-	93.8	96.9
1861	89.9	91.7	98.0
1871	91.2	96.4	90.7
1881	92.9	104.9	91.1
1891	93.3	108.5	85.5

Source: Decennial Censuses of Scotland, 1851-1891.

The larger proportions of men in Falkirk and women in Hawick resulted, in my opinion, from a combination of selective in and out-migration caused by the occupational structures of the two towns. Moreover, if a process of selective migration was at the root of the sex imbalance in Falkirk, then one would expect this to have been most obvious in the younger adult age groups since the iron industry required its workforce to be fit and strong.

Accordingly, the data in Table 3.3, giving the sex ratios for specific age groups, demonstrates that the extremes of male predominance in Falkirk were located in the 15-19 and 20-24 age groups. On the one hand, the iron foundries were therefore attracting young men into the town, either independently or as the sons of migrant families,⁵⁹ and, on the other, the lack of employment for young women may have been causing a flow in the opposite direction, possibly to Edinburgh where they could have entered domestic service. Conversely in the textile town, young women or families with many daughters may have been tempted by the

work opportunities and thus moved into Hawick, whilst the local young men may have been forced to seek employment elsewhere.⁶⁰

Table 3.3. Sex Ratios (Males per 100 Females) Specific Age Groups, 1871 and 1891.

Age Group	Falkirk		Hawick	
	1871	1891	1871	1891
15-19	118.9	127.3	85.4	92.1
20-24	109.4	131.9	83.6	63.0
25-29	94.8	116.8	72.5	65.5
15-49	99.1	121.4	84.6	76.7

Source: Decennial Censuses of Scotland, 1871 and 1891.

On the basis of the evidence provided, it can be concluded that processes of in and out-migration were contributory factors in the population increase observed for both the towns. Furthermore, these migratory processes were both age- and sex-specific in relation to both locations. However, before going on to consider certain of the ramifications occurring as a result of particular imbalances in the sex ratios, let us first examine more closely the age structures of the two Scottish towns.

Age Structure

The age breakdowns presented in Tables 3.4 and 3.5 for selected age groups perhaps demonstrate in another way the effects of specific processes of migration. The iron town of Falkirk consistently had a larger proportion of its male population in the age groups shown, than both the textile town and the country as a whole. Moreover, this pattern of male predominance in Falkirk has become even more pronounced by 1891, as evident from the figures in Table 3.5.

Table 3.4. Age Structure (Number in age group by sex as percentage of total population) Scotland, Falkirk and Hawick, 1871.

MALES

	15-19	20-24	25-29	15-29	15-44
Scotland	5.0	4.1	3.4	12.6	20.4
Falkirk	5.1	4.4	3.6	13.1	21.4
Hawick	5.0	4.3	2.9	12.2	19.8

FEMALES

Scotland	5.0	4.6	4.1	13.7	23.2
Falkirk	4.3	4.0	3.8	12.1	21.1
Hawick	5.8	5.1	4.0	14.9	24.1

Source: Decennial Census of Scotland, 1871.

Conversely, the textile town had a larger proportion of females than either Falkirk or the whole of Scotland and again this age structural imbalance had increased by the later date.

Table 3.5 Age Structure (Number in age group by sex as percentage of total population) Scotland, Falkirk and Hawick, 1891.

MALES

	15-19	20-24	25-29	15-29	15-44
Scotland	5.2	4.3	3.6	13.2	21.6
Falkirk	5.6	4.9	4.4	14.9	24.8
Hawick	5.3	3.5	3.0	11.8	20.1

FEMALES

	15-19	20-24	25-29	15-29	15-44
Scotland	5.2	4.7	4.2	14.0	25.7
Falkirk	4.4	3.7	3.8	11.9	30.2
Hawick	5.7	5.5	4.5	15.7	26.1

Source: Decennial Census of Scotland, 1891.

The sex ratio and age structure data presented in Tables 3.2 to 3.5 clearly indicate that the two towns of Falkirk and Hawick had very different types of population structure, primarily distinguished by sex. Furthermore, it seems evident that such patterns are directly associated with the specific industries which dominate each town, since both the manufacture of iron and textiles have been seen to attract or discourage a workforce with particular characteristics. Let us turn now to an examination of some of the effects that these sex imbalances in the local populations may have had, specifically with regard to the age of marriage and the numbers ultimately marrying.

Marriage

The proportions of women ever married in five year age groups in 1871 are presented in Table 3.6 and it can be seen that up until a woman was in her mid-thirties, there was a greater likelihood that she would be married if she lived in Falkirk as compared with Hawick. By the age group 25-29, seventy per cent of the women in the iron town were already married, in contrast with just over fifty per cent in the textile town. It is interesting to note that approximately the same proportion of women were married in Hawick as in Scotland in the 25-29 age group. This then would tend to indicate that a much larger proportion of women in Falkirk were marrying younger than was the practice for the country as a whole.

Table 3.6. Proportions of Women Ever Married, Five Year Age Groups, Falkirk and Hawick, 1871.

Age Group	Scotland	Falkirk	Hawick
15-19	2.8	2.2	2.4
20-24	30.0	36.8	26.2
25-29	53.7	70.8	54.3
30-34	65.3	80.1	71.8
35-39	67.6	77.4	78.8
40-44	66.7	82.6	81.9
65+	79.4	84.1	79.0

Source: Decennial Census of Scotland, 1871.

In order to see more clearly the differences in marital behaviour exhibited by those in the two towns, we shall concentrate on the 25-

34 and 45-54 age groups. The proportion of unmarried women in the former age group has been used as an estimate of early marriage and the proportion in the latter as an indicator of the percentage who ultimately marry.⁶¹ This data is presented for Falkirk and Hawick in Table 3.7, as well as for Scotland as a whole.

Table 3.7. Proportions of Unmarried Women, Falkirk and Hawick, 1871.⁶²

Age Groups	Scotland	Falkirk	Hawick
25-34	37.7	24.9	37.7
45-54	20.0	14.0	15.2

Source: Decennial Census of Scotland, 1871.

According to the figures in Table 3.7, only one quarter of the women in the iron town were not married in the 25-34 age group, whereas in Hawick and Scotland this proportion was more than one third. However, in the age group 45-54 this differential between the towns had all but been eradicated, either by late marriages conducted by the women in Hawick or possibly through an out-migration of older, single women which would have reduced the proportion of those never marrying in the textile town.

However, a major drawback to this analysis is the dependency upon data taken from a single census year. In other words, the marital experience of those women in the 45-54 age group in 1871 may have been radically different from that predicted by the 25-34 age group, due to possible changes in the age structure and the sex ratios. For example, if we consider the same data for both 1871 and 1891, as

presented in Table 3.8, then a clear alteration can be observed. By the later date, more women in Falkirk were ultimately marrying in stark contrast to the textile town where the reverse was the case. In addition, a larger proportion of women in Hawick remained unmarried in the 25-34 age group in 1891. If this data is considered in association with the changing nature of the sex ratios, particularly in the younger age groups,⁶³ then one possible explanation emerges, whereby the overall predominance of men left few women unmarried in Falkirk and the proportionately larger number of women created a surplus in Hawick.

Table 3.8. Proportions of Women Never Married, Falkirk and Hawick, 1871 and 1891.

Age Groups	Scotland		Falkirk		Hawick	
	1871	1891	1871	1891	1871	1891
25-34	37.7	40.1	24.9	23.1	37.7	44.4
45-54	20.0	18.7	14.0	10.4	15.2	18.5

Source: Decennial Censuses of Scotland, 1871 and 1891.

In other words, differing patterns of nuptiality were being affected by various imbalances in the sex ratios, which were in turn brought about by variations in the occupational structures of both towns. In this way then occupationally-specific factors can already be held responsible, in part at least, for certain observed demographic patterns. That is, the iron industry, requiring as it did a young, strong, male workforce, encouraged the in-migration of such individuals to the town, who for their part were drawn by the

availability of work and the payment of comparatively high wages. Therefore, large numbers of young men in the iron town were in a position which not only encouraged marriage but also allowed it to take place early.

In addition, the distinct lack of female employment meant that women in Falkirk had one less disincentive to marriage. On top of all this, the fundamental forces of supply and demand may have operated to ensure fewer unmarried women in Falkirk and an earlier age of marriage than the situation in the textile town. However, a fuller discussion of the age of marriage and its determining factors will be returned to at various points throughout this study as we begin to analyse the micro-level data.

It has to be said that within this particular thesis, the major emphasis has been placed on female age of marriage and on the proportions of females who did and did not marry. The age pattern of male marriage has not been given any prominence, although the availability of males for marriage has been highlighted. This bias in coverage stems directly from the fundamental nature of the enquiry undertaken, in that the timing of entry into marriage for females is more important in relation to the subsequent pattern of reproduction.

Conclusion

This chapter has provided an array of social, economic and demographic material relevant to the iron and textile industries of both Falkirk and Hawick. This information will subsequently be used

to facilitate explanations for the various patterns of marital and reproductive behaviour which will be presented and discussed in Chapters Five to Eight. As such, the background material in this chapter forms one half of an explanatory tool which will be brought to bear upon the primary data, with the other half being comprised of potentially useful theoretical arguments to be discussed in Chapter Four.

Chapter Four

THEORETICAL THREADS IN FAMILY FORMATION

Introduction

In this chapter the focus shifts to a more theoretically based consideration of the determinants of nuptiality and fertility patterns. The intention is not to provide fully comprehensive accounts of the various debates within the literature, but rather to select those points and arguments which are felt to be directly relevant to the investigation of family formation patterns in Falkirk and Hawick in the second half of the nineteenth century. Factors influencing nuptiality will be dealt with first and then the discussion will move on to consider fertility.

NUPTIALITY

The term nuptiality is often taken to encompass both the incidence of marriage within a population and the age at which marriage occurs. In this particular thesis, it is the latter which is of primary concern, since the proportions who marry or remain single are only of interest, as far as fertility is concerned, if the overall fertility rate for a particular group or area is being studied. On the other hand, the absolute number of unmarried individuals in a population will almost certainly affect the age at marriage and for this reason, the variable must not be dismissed altogether. In the following section, therefore, the major emphasis will be placed upon the relationship between the age at marriage and

the various factors discussed.

In any study of marriage the sphere of relevant decision-making must be perceived as extending beyond the individual and encompassing kin, the community and even the wider societal structure. For example, Anderson talks of "a system of opportunities and constraints" within which the individual's decision is located but which remains "the common property" of the community;¹ Bourdieu refers to the concept of 'habitus' to describe a system of schemes which structure every decision but which never become completely or systematically explicit;² and Wrigley and Schofield speak of marriage as a deliberate act involving not just the couple concerned, but also their kin and the wider community who together produce an assessment of expectations for the future.³ In an attempt to be more specific about these schemes and assessments, the following six factors relating to marriage patterns, which generally appear in the literature, will each be discussed in turn: the sex ratio; the male occupational structure; the female occupational structure; the availability of employment for children; the general standing of the economy; and social customs.

Sex Ratio

The sex ratio, that is the proportion of males per 100 females, is important in that it defines the pool of those eligible to marry within a specific locality. In strict terms, only the sex ratio pertaining to certain age-groups is of major significance since marriage below a specific age is illegal and that which occurs after

forty five years of age no longer has any significant effect on fertility.

In nineteenth century Scotland the balance between the sexes was influenced by: inequalities in conceptions, in rates of miscarriage, stillbirth and infant death as well as through differential rates of emigration. In general, the net result was an imbalance in the sex ratio in favour of females; for instance, the figure for Scotland in 1871 was 91.2.⁴ Internal movements of the population also affected this ratio to the extent that a large in-migration of males from rural to urban areas could radically alter the sex ratio characteristics of both localities and therefore there may be a close association between the sex ratio and the male and female occupational structures.⁵

In terms of the proportions marrying, any major imbalance in the sex ratio will tend to act in favour of the minority group, and in some instances, the age at marriage may also be affected. For example, (as already mentioned in Chapter One) where young males heavily outnumber young females, as in mining communities, the age at marriage for females especially, may be pulled down possibly through the operation of market forces whereby demand exceeds supply.⁶

Male Occupational Structure

The male occupational structure tends to affect both the age at marriage and the proportions marrying in a manner which is dependent upon the predominant forms of employment and their associated

characteristics. For example, in heavy industry peak earnings capacity was often reached while a man was still young, thus encouraging earlier marriage by creating the possibility for establishing an independent household.⁷ In contrast, employment in agriculture acted to defer marriage since economic independence was not attainable at such an early age, if at all. The connection between male employment, the sex ratio and marriage patterns has already been intimated in Chapter One, whereby a process of selective in-migration on the part of males was put forward as a determining factor causing high levels of marriage among females and possibly also leading to a lower age of marriage.⁸

Female Occupational Structure

Turning now to the availability of employment for women, which has been cast as an important factor in explanations concerning variations in the age at marriage for both males and females,⁹ it is the precise nature of the work which is seen as crucial, in contrast to its mere existence. It has been argued, for instance, that women in the past have always had to work and consequently the only distinguishing feature of women's work in the nineteenth century was the potential for separating work done in the home from that carried out elsewhere.¹⁰ Full-time, paid employment, located outwith the home, may have offered an alternative to early marriage for females in that their work provided them with the independence from their own families they might otherwise have sought in a marriage. For instance, in areas where the opportunity for women's work existed, for example in the Lancashire cotton mills¹¹ or the jute mills of

Dundee,¹² the female age at marriage was relatively high. These textile centres were also the focus for a good deal of in-migration of young females, which in turn created an imbalance in the sex ratio and consequently led to a large proportion of women remaining single. Once again, the complex relationship between employment patterns, the sex ratio and the age at marriage is evident.

In areas which offered few opportunities for female labour-force participation, early marriage has been observed and a strong association between the two elements has been put forward.¹³ For instance, in the iron town of Middlesborough in the 1890s the only type of work available for young women was either in domestic service or in a draper's shop. The former was unattractive to many and the latter required two years unpaid work before any meagre earnings were forthcoming.¹⁴ It is not, therefore, surprising that the majority of young females preferred an early marriage to this sort of employment.

So far the discussion has only centred around women's work outside the home which existed prior to marriage and therefore attention must now be given to work occurring within the domestic realm as well as to the pattern of work expected after marriage. Paid work which could be accommodated within the domestic setting and which had been carried out before marriage could also be continued afterwards as long as the necessary tools or equipment were still available. There are many examples of this within the textile trade where the finishing or sewing up of garments, the winding of yarn, framework knitting or handloom weaving could all be done

within the home. In this case, it is unlikely that the employment available for women represented a barrier to early marriage although equally, it is unclear as to whether it acted as an inducement.¹⁵ Work which could be taken on by married women at home was probably a more important factor in determining fertility behaviour and as such will be returned to later in the chapter.

It would seem to be important to differentiate between the type of work that a woman was engaged in prior to marriage and the forms of employment available following this event. For example, it was possible for some women to retain their positions at work after marriage, although this was by no means always the case, especially once young children entered the picture. The manager of Cowan's paper mills at Penicuik stated in 1864 that his company did not employ the mothers of young children except in cases of hardship.¹⁶ In a similar vein, a young woman working in a polish factory, albeit in 1913, was given a small bonus along with her notice of dismissal at the time of her marriage as the firm simply did not employ married women.¹⁷ On the other hand, women working in textiles often continued to work after marrying and in fact it was usually financially imperative for them to do so. There is indeed evidence that in textile towns marriage, childbearing and continued employment were all achieved by some women, with their own mothers sometimes looking after any babies and small children.¹⁸

If a moment's speculation is allowed, then perhaps some connection can be made between expectations of future work, on the part of women already working, and decisions concerning the age at which to marry. If paid work was available and seen as continuing after

marriage (and even on through the process of family building) then there was possibly no perceived need to defer marriage. If, on the other hand, full-time paid employment was seen to terminate at, or around the time of, marriage then this may have provided a sound reason for a postponement of marriage. Although this is maybe attaching too high a degree of rationality to the decision as to when to marry, it seems unlikely that such matters would have occurred in a totally haphazard manner.

There are two further points to be made concerning women working, although they do not directly relate to the age of marriage in such an obvious manner as those already discussed. Firstly, in some households the labour-force participation of the wife may only have been called upon in times of emergency or during 'critical life situations', such as when the husband was ill, temporarily unemployed or dead. Secondly, many married women almost certainly worked intermittently in return for earnings, by engaging in such tasks as taking in washing, cleaning houses, running small cafes or keeping lodgers, and as such, they avoided being recorded as in employment by the official returns in the last century.

In both these instances the perceived availability of such employment may have affected the decision to marry, although it is recognised that once again rational forms of behaviour are perhaps being ascribed to less organised events. What this brief discussion does indicate is that the relationship between women's work and patterns of marriage is complex and should always be dealt with in some detail, since it is the precise **form** of the work and not merely

its availability which is of primary importance.

Children Working

Having discussed male and female employment in relation to the age of marriage, it would also seem useful to briefly consider the availability of work for children in the same light. Throughout the course of the nineteenth century, legislation was introduced to restrict and ultimately abolish full-time paid child labour, replacing it with ever-lengthening periods of education. However, there were various leads and lags depending on particular occupations and localities and also on the standard of enforcement of the new regulations.

Child labour in mines and factories was affected early, although control over work within the domestic setting was far more difficult to achieve. With reference to the age of marriage, the availability of employment for children at an early age would have created a relatively short period of dependence in which the child was not contributing to the family economy. In contrast, where little work for children existed, this period of dependency would be much longer, thus making the children more of a liability. Therefore, seen in these terms, the availability of employment for children, together with the extent of compulsory education may reasonably be pointed to as intervening factors in the decision to get married.

The Economy

Turning now to the economy, it is generally recognised within the literature (as indicated in Chapter One) that a relationship exists between the prevailing economic situation and the age at marriage, although the precise mechanism remains unclear. Wrigley and Schofield link the standard of living with the marriage age, where a rise in the former is followed by a corresponding fall in the latter.¹⁹ Their arguments add weight to the work of Glass in which industrial expansion and rising real wages were seen as leading to a fall in the age of marriage in contrast with a contracting economy and falling standard of living where marriage became deferred.²⁰ On the other hand, both Levine and Anderson have suggested that rather than simply concentrating on movements of real wages, attention might be more effectively focused on the differentials in opportunities and limitations surrounding marriage which may have been brought about by changes in the economic structure of society in the nineteenth century and before.²¹

It is, however, easy to fall into the determinist trap of associating an alteration in the economy, whether it be at the national or the local level, with a parallel change in the marriage age, having first made due allowance for a reasonable time lag. The problem with this approach lies in its inability to explain, or even attempt to explain, the actual mechanism of causation. In other words, how is a change in the standard of living or an increase in opportunity firstly perceived and then translated into action? Since both of these factors will be experienced by different groups of the population at different times, studies at a micro-level will

provide the most appropriate means for examining this question.

Arguments relating to this subject are of course hypothetical as far as past populations are concerned, however, one element which is more certain than others is that individuals acting out their lives in the past did not do so alone but rather they were influenced by the behaviour of others. Thus, an appraisal of likely and available reference groups must be made which will subsequently provide an assessment of the types of pressure which may have emanated from this source.²² Throughout the present thesis the effect of reference group influence will be continually discussed in relation to what has been called the 'shadow effect', where the behavioural patterns exhibited by the dominant industries in the two Scottish towns may be adopted completely, partially, or not at all by other workers in the same locality.

Social Custom

Lastly, social customs or traditions may also be regarded as playing a part in determining the age of marriage. Generally accepted practices, which may at one time have originated from rationally grounded decisions brought on by particular events or needs but which have long since lost their pertinence, may still be adhered to or at least may exert some influence over behaviour. For instance, it has been shown for nineteenth century Scotland that certain times of the year were, in certain places, favoured above all others for the celebration of marriages²³ and this has been explained by a bundle of factors which incorporate practical reasons arising out of

events in the agricultural calendar, patterns of short-range migration, the availability of housing and also by various social customs.²⁴

In the case of the observed seasonality of marriage, social custom was an explanatory category comprising a mixture of superstitions, past practices and present needs which had been formed into a common body of local knowledge. As such, social customs are theoretically distinct from rational-oriented behavioural decisions. From the point of view of the age at marriage, certain local traditions may enter the perceptual apparatus of those deciding to marry and furthermore they may affect that decision in some manner. Once again, historical analysis of patterns of past populations can only deal with this matter within the confines of the micro-level study.

To conclude, the age of marriage may be subject to the influence of any of the six factors described above or any combination of these factors. In the literature to date, the effects of the sex ratio, the employment patterns of men, women and children and the general state of the economy have all been emphasised to varying degrees. However, certain aspects of these factors together with the sphere of custom and tradition, have not been sufficiently discussed due, in the main, to the level of data at which most investigations have taken place. Studies at the national or even the regional level can in no way identify the mechanism of causation which leads some groups of the population to marry at an earlier age than others and in fact in some cases cognisance is not even given to the wide diversity which existed in the age at marriage. For instance, Flinn, et. al., while discussing the average age at first marriage

in Scotland in 1871, which stood at 27 for men and 25 for women, make the suggestion that this average age was "seldom unusually low anywhere, at any time".²⁵ In the context of the figures which will be presented for Falkirk and Hawick in the 1860s, this conclusion of Flinn's will be seen to be at best somewhat misleading.

FERTILITY

Let us now turn our attention to the patterns of family building occurring once marriage has taken place and exposure to legitimate conception has begun.²⁶ In the first instance, deliberate attempts to control fertility will be disregarded, whilst the discussion focuses on certain involuntary factors associated with observed variations in patterns of 'natural' or uncontrolled fertility. The emphasis will then move on to the existence or otherwise of any birth control practices in the past, before reviewing some of the economic theories of fertility and finally looking at some of the latest theories concerning the fertility decline.

Uncontrolled Fertility

The concept of 'natural' fertility, originally referred to by Henry²⁷ and given considerable substance by Davis and Blake,²⁸ is now regarded as a misnomer, in that despite the absence of any deliberate control, the predicted maximum family size is seldom attained. Hypothetical calculations made for women who embark upon early marriage and who complete their reproduction without having recourse to any fertility regulation, suggest that a feasible number

of births would be thirteen.²⁹ In contrast, the largest observed figures, those of the Hutterites, show an average completed family size of just over ten, where the median female age at marriage was twenty-two.³⁰ In addition, a study of very fertile women in the poorer classes in the St. George's in-the-east district of London, indicated that the average number of children born to each mother was 9.12,³¹ although the calculations probably underestimated the true fertility and consequently the figure of 10 is, according to one contemporary,³² more trustworthy. There is, therefore a marked discrepancy between what could be described as potential reproductive capacity and actual, observed mean family size and as a result, the term uncontrolled fertility has come to be preferred to natural fertility as it seems to encapsulate the concept more successfully.

One reason for the lower levels of actual fertility is the intervention of certain non-volitional, limiting factors. For example, periods of illness may lead to temporary impotence or sterility, a poor and insufficient diet may reduce the likelihood of conception whilst simultaneously increasing the chance of a miscarriage or a stillbirth,³³ and abstinence from coitus due to post-partum and lactational amenorrhoea will act to restrict completed family size.³⁴ In this way, involuntary limits on fertility may be seen as contributing to an explanation for the shortfall from the theoretical maximum with some even going so far as to suggest that this is a sufficient reason in the case of pre-modern societies.³⁵ It is therefore imperative to review the literature pertaining to the voluntary control of fertility in the

past with the ultimate intention of deciding whether the childbearing patterns exhibited by the workers of Falkirk and Hawick should be regarded in the light of an uncontrolled fertility regime or one in which elements of deliberate control were operating.

Birth Control in the Past

It has been shown that knowledge of contraception existed in ancient China and Egypt as well as in the time of the Greeks and the Romans,³⁶ although this does not, of course, indicate widespread use. Rather, methods of contraception were probably only used by small elite groups and even those on a fairly haphazard basis.³⁷ The debate surrounding the regulation of fertility in the past has therefore been split into two main strands both of which have undergone certain modifications since their original formulation.

One set of arguments regards contraception as an innovation, its main usage beginning in earnest around the 1870s in many western European countries including Britain³⁸ with the effects first becoming noticeable for the upper and middle classes, followed by a process whereby the ideas percolated down through the social scale to the working classes.³⁹ This has therefore been hailed as the major cause of the decline in overall fertility occurring within western societies at this time.

The other side of the debate prefers to see couples as adjusting their fertility behaviour to suit the altered economic and social conditions of society at that time and despite having always possessed the capability to control their family size, they had

lacked the corresponding motivation.⁴⁰ Let us firstly examine the original statements of these two points of view and subsequently discuss the modifications which have since been put forward.

The essential difference between the innovation and adjustment approaches lies in the basic assumptions made by each. For instance, those who argue in favour of innovation regard a deliberate and conscious family planning mentality as only developing in the later decades of the last century in line with the increasing availability of contraceptive devices. Prior to this, certain 'folk remedies' may sometimes have been used, although these were mostly "symbolic, magical and without real efficacy."⁴¹

As a result, arguments concerned with innovation have emphasised the development of the various mechanical means of contraception, together with the differential access to both the knowledge and the devices, at the expense of neglecting what may have been quite effective 'folk remedies'. Therefore, having discussed such matters as the vulcanisation process for rubber, which permitted the manufacture of thinner sheaths, as well as the existence of the douche, sponge and pessary,⁴² the innovation arguments then proceed to cite the explosion in birth control propaganda, especially associated with the Bradlaugh - Besant trial in 1877, as evidence for the widespread dissemination of this knowledge.⁴³ Access to information about fertility control is, according to supporters of the innovation theory, gained first by the literate middle classes, whose motivation for its adoption stems from a desire to maintain their particular standard of living.⁴⁴

However, certain groups within the working class are also regarded as being in the vanguard of this innovation in fertility behaviour, most notably those engaged in the manufacture of textiles.⁴⁵ In this industry women often came together in the workplace thus providing an ideal setting for the latest ideas to be discussed.⁴⁶ Moreover, the motivation for regulating the size of families also existed, in that the period of a child's dependency had been increased by the 1870s to twelve years through restrictions having been placed on the eligibility of children working in textile mills and factories.⁴⁷ It has also been argued, in a slightly more speculative way, that in households where the wife worked and in particular, where the husband and wife worked in the same place, as in some textile mills and workshops, there may have been more of a joint approach to life, which may equally have applied to discussions concerning family size and its possible limitation.⁴⁸

The major drawback in the innovation argument, presented thus far, is that the decline in fertility undoubtedly occurred prior to the successful development of adequate mechanical means of contraception. Therefore to posit a direct association between the two events would be somewhat misleading. That is, of course, not to say that developments in the field of contraceptives have had no effect in reducing fertility, but rather that this did not take place until the twentieth century, possibly not until after the Second War. In terms of an explanation for the beginning of the fertility decline, other causes must thus be sought. However, before discussing some of the refinements to the innovation approach, let us first look at the main alternative set of

arguments.

Those who argue that the fertility decline came about as a result of an adjustment process⁴⁹ regard the capability for regulating fertility as having always been present, albeit often in a latent form, but that economic and social conditions in the past had acted to encourage most groups in the population to maintain a large family size. By the 1870s, in contrast, altered social and economic conditions were discouraging couples to have many children and certain groups were affected earlier than others.

However, simply to indicate that working class families were larger than those of the middle class does not of necessity imply any ignorance of the means whereby fertility could have been controlled. In other words, the two different classes may have had "two different goals which they sought to achieve in their own particular fashions".⁵⁰ Arguments favouring a process of adjustment must therefore endeavour to explore the forms which contraception in the past could have taken, although not yet systematically employed, and further explain the reasons leading to their widespread use.

Coitus interruptus, the practice of withdrawal prior to ejaculation,⁵¹ has been described as a form of fertility control which was dependent upon the consent and willingness of the male and as such was more common where "women were in a position to persuade men to practise it" which tended to occur "in the context of illicit relations at an earlier date than in that of marriage".⁵² Whether coitus interruptus was therefore more common within families where the wife had an equal share in decision-making is a point to be

borne in mind. Obviously, it is impossible accurately to assess how often this practice was employed and by whom, since the only available evidence regarding the 'Sin of Onan' comes from church records and the amount of corresponding fuss and noise from this quarter is hardly a reliable indicator of widespread use.

The two other traditional forms of fertility control, which are described by those in favour of an adjustment argument, are abstinence and abortion. Abstention from coitus was probably universally recognised as a means whereby conception could be prevented,⁵³ although like coitus interruptus it is impossible to do more than speculate with regard to its usage. As an aside, it is reported that one woman, at least, avoided conception by staying up late at night mending clothes until she was sure her husband had fallen asleep.⁵⁴

The last form of proposed fertility regulation, abortion, was made illegal in 1803, although interpretations of this act varied. For example, many believed that up until the foetus had 'quickened', that is begun to move, a stage occurring between three and four months after conception, they were 'irregular' as opposed to pregnant and consequently any method designed to bring on a late period was perfectly legitimate and quite distinct from inducing a miscarriage.⁵⁵ Various methods were used to achieve this late period, including the imbibing of hot soapy water, penny royal syrup, neat gin or a combination of aloes and turpentine, the consumption of diachylon pills containing lead or indeed there was always the controlled fall downstairs.⁵⁶ Any strenuous exercise was also deemed appropriate and in the case of upper class women, a good

deal of horse-riding may have had the desired effect.

Recourse to abortion in the past has been conceptualised as "a second line of defence" if the first line, that is coitus interruptus, failed and indeed it is claimed that by the end of the last century, new patent medicines or tonics, marketed as abortifacients, were being used by "significant numbers of women" which is in turn seen as indicative of a desire both to control fertility and to go to considerable lengths to achieve a successful result.⁵⁷ However, the evidence is scant and there is a suitable vagueness regarding the women described.⁵⁸

In order to achieve some leverage on the reasons behind the procuring of abortions, it would be necessary to know the age and marital status of those concerned as well as information regarding existing children. It may also be quite wrong to view coitus interruptus as a first line of defence and abortion as constituting the second, since in fact they may represent two completely separate forms of control, one of which is dependent on the male's consent while the other is more the property of the female. However, the major drawback to the approach favouring a process of adjustment lies in the production of evidence for phenomena which are essentially unmeasurable and where limited proof of existence is no guarantee of widespread knowledge or use.

If knowledge about birth control has always been present, yet has remained dormant due to the operation of higher thresholds of family size, then what altered circumstances motivated its use? The adjustment argument states that a new set of motivational forces

located within the social and economic framework of society began operating to create new levels of ideal completed family size.⁵⁹ In basic terms then, the adjustment side of the debate sees the motivation for a reduction in fertility as bringing into play traditional knowledge regarding ways in which this could be achieved, whereas in contrast, the innovation arguments attempt to show that the motivation occurred simultaneously with the development of certain forms of contraception capable of servicing this need.

Knodel has seen as unfortunate the connection between the concept of innovation and the development and availability of mechanical means of contraception.⁶⁰ In his view, it is important to distinguish between innovation in relation to means and innovation as defined by acceptability. It therefore may well have been that methods of birth control were indeed known in the past but that they were either the property of certain groups within the population or they were associated with extra-marital sexual activities and subsequently not suitable for use within the context of the family for the purpose of controlling its size.

Knodel is thus advocating an approach which combines elements from both the adjustment and the innovation sides of the debate, where the use to which contraceptive knowledge is put is adjusted to suit innovative forms of behaviour. The explanatory power of the economy is thus diminished and is replaced by an emphasis on changing cultural processes which fashion family limitation into a normative form of behaviour.⁶¹

Most recently, work by Lesthaeghe and Wilson⁶² and Lockridge⁶³ has pointed to secularisation, as part of the wider process of cultural change, as constituting the vital factor and perhaps the only necessary condition for allowing family limitation to become an established practice and thus causing the fertility decline in western societies. In the same way, alterations occurring in the locus of family decision-making, whereby the wife may have gained the opportunity to voice her misgivings over too many pregnancies and too many young children, may also have formed a part of the overall process of cultural change.⁶⁴ These arguments, then, point the way to a close examination of social processes and cultural influences which may have encouraged the practice of family limitation. For example, in the case of Britain, the Bradlaugh - Besant trial in 1877 may not only have put the subject of birth control onto breakfast tables throughout the land⁶⁵ but it may also have helped to transfer such practices as coitus interruptus into the realm of acceptability.

Rather than attempting to thrash out one particular unified thread from this innovation - adjustment debate, it is of greater value in the present setting to regard the various arguments covered in this section as a repertoire of analytic tools which may be subsequently applied to the specific circumstances surrounding the family formation processes in Falkirk and Hawick. In other words, many of the ideas expressed under the heading 'birth control in the past' will be used in later chapters as pegs on which to hang explanations relevant to the micro-level Scottish data.

MOTIVATION FOR FERTILITY CONTROL

Both the adjustment and innovation arguments, so far discussed, tend to be fairly inexplicit in their explanations concerning the motivational forces underlying the adoption of family limitation. Consequently, we must now turn to the 'economic' approach to fertility⁶⁶ which constitutes an important element within the overall adjustment approach.

The central tenet of the economic or utilitarian approach is that fertility behaviour is determinable by the outcome of a series of choices made by each household, whereby subjective tastes and preferences are weighed against external constraints of price and income in order to arrive at a decision which maximises satisfaction.⁶⁷ The desire for each child is subsequently played off against the desire for any other additional consumer goods through a process of considering the costs associated with each. In the case of a child, the opportunity cost of the time required for child care is matched against the amount of satisfaction which may be obtained, together with the price involved in any attempts at not having that child, with the latter including both market price and subjective or psychic costs.⁶⁸ In the literature, the economic approach has been shown to also have significance for the study of fertility behaviour in the past and in terms of the present thesis, the elements of household income, child care costs and subjective costs arising out of fertility control would appear to be particularly pertinent. Let us deal with each in turn.

A strong relationship between patterns of fertility and household

income was hypothesised by Malthus, whereby an increase in the latter was seen to cause a corresponding increase in the former, through permitting earlier marriage, obviating the necessity of abstinence and reducing child mortality.⁶⁹ Becker, on the other hand, regards a rising level of income as leading to an increase in both the quality and quantity of the children that parents wish to have. Where those with low incomes are seen to have more children than those whose income is greater, the explanation is seen to lie either in the demand for higher quality children or in the differential access to birth control knowledge.⁷⁰ Thus, a more limited view is that the economic model only really relates household income to the number of children a couple desire, rather than offering in contrast an explanation of the number they may actually have since this may exceed the ideal family size where contraceptive ignorance or inefficiency intervene.

This concept of ideal family size, which acts as a target for actual completed family size, is affected firstly by the number of surviving children a couple would have if fertility were totally unregulated, secondly by the number of children parents would want if there was perfect contraception,⁷¹ and thirdly, by the perceived costs of regulating fertility.⁷² The crucial determinant is whether the first will exceed the second and so stimulate consideration of the third.

In the last century, according to Easterlin, both infant and child mortality were so high as to demand equally high levels of fertility in order to maintain a demographic balance and consequently the primary concern of couples was one of excess demand not excess

supply.⁷³ In other words, there was no motivation for any regulation of fertility which might have inhibited the completed family size.⁷⁴ In my opinion Easterlin's hypothesis shows itself to be radically removed from reality, in that it restricts itself to the general and fails to account for the particular. By this I mean that some couples, in the last century, may have tried desperately to cancel the effects of mortality on their ultimate family size, but in contrast others will most definitely not have had this experience. It is therefore the inflexibility within Easterlin's argument which is questioned.

Turning now to child care costs, for any family there are obvious increases in expenditure on food and clothes which a child entails; in addition, there is a further cost incurred where the earnings or work of the wife, usually, have to be foregone during the period of caring for the child.⁷⁵ The opportunity cost of the time spent in child care is conceived as rising in parallel with any increase in the wages for women's work, since the calculation is made on the basis of potential earnings. Therefore, if women's wages rise, the inducement is seen as being towards fewer children, since (all other things being equal) more alternative consumer goods would have to be foregone if a woman left or failed to rejoin the labour force.⁷⁶ However, in settings where women working and childbearing are both compatible, as in agriculture or in certain forms of domestic work,⁷⁷ the opportunity cost of children is not as high; in these cases, female labour-force participation does not necessarily deflate the levels of fertility.⁷⁸ In this way, the economic approach is able to give some substance to the interpretation of the

relationship between women's work and fertility by pointing out one way in which the two may interact.

Finally, the costs encountered in any attempt at regulating fertility remain to be discussed. The cost of fertility regulation can be divided into what must be paid in terms of the market and what must be experienced in the way of guilt or shame if normative prescriptions are broken. Therefore, in the same way that the economic approach injected an element of rigour into the association between married women's participation in the labour force and the corresponding levels of fertility, so too does it add some analytical strength to the study of the costs to the individual of fertility control.

Criticisms of the 'Economic' Approach

However, there are certain criticisms which have been made of the economic approach to fertility, many of which have been aimed at the portrayal of choice-making, occurring within the household, as taking place under no limiting conditions.⁷⁹ On the other hand, Easterlin has since claimed that there is space within the economist's concept of tastes in which to accommodate the sociologist's emphasis on constraints,⁸⁰ where a whole host of tastes ultimately form a preference system, which is the end product of heredity and an individual's past and present environment, but which is also constantly open to modifications stemming from ongoing experiences in the spheres of work and the home.⁸¹ Whereas, traditionally, economists have held tastes constant, as an analytic

device, Easterlin is now encouraging the view that change over time must be taken into account.

Easterlin's modification is also helpful in deflecting a further criticism of the economic approach; its unrealistic usage of the concept of target family size where demand is regarded as fixed following a one-off decision at the time of marriage. The refinement put forward by Namboodiri,⁸² where decisions concerning additional children are viewed as being made sequentially, that is at different points throughout the life cycle with the ideal family size being constantly re-negotiated in light of altered circumstances, again, like Easterlin's model, caters for changing tastes. On the whole, however, the arguments concerning sequential processes of decision-making, as they relate to fertility behaviour, are more easily studied in the case of modern planned contraceptive societies.⁸³

The last criticism which I wish to mention concerns the economic approach's tendency to ignore conflict within the household, in favour of a picture dominated by at least tacit agreement.⁸⁴ This may of course be more of an analytic device than an attempt to accurately mirror reality, but nevertheless it is a considerable drawback. For example, an acceptance of this stance would effectively close off any discussion of the relationship between males and females in terms of power and decision-making within the domestic realm and the effects that such variations may have had on patterns of fertility. In light of these criticisms, the economic approach alone is not therefore adequate in its overall treatment of fertility behaviour but rather should be used as one means whereby a

fuller understanding of patterns of childbearing may be achieved.

SOME LATEST THEORIES OF THE FERTILITY DECLINE

The interest in the fertility decline shown by economists throughout the 1960s and 1970s has acted as a spur for certain other social scientists to be both more sociological in their approach whilst simultaneously as rigorous. In fact, it would be difficult, and unnecessary for that matter, to label the recent theorists as either economists or sociologists, since technically they form an amorphous collection comprising geographers, anthropologists and demographers, all of whom have been drawn into historical demography through their various attempts at explaining the fertility decline.

Over the period of a number of years, Caldwell has been developing, modifying and refining his concept of 'wealth flows' in his attempts at understanding stable, high fertility societies, which he believes is a precondition for the analysis of the sustained fertility decline.⁸⁵ The argument is that change cannot be understood without prior knowledge of the previous circumstances. Caldwell believes that there are only two kinds of societies as far as demography is concerned; one in which unlimited fertility is economically advantageous and one where any fertility is of no economic advantage.⁸⁶ In this way, then, Caldwell sees all societies as exhibiting economic rationality with regard to fertility behaviour and further that the economic rationality for high fertility will be restrained by a non-economic ceiling in the same manner as non-economic factors construct a floor where economic rationality

suggests a strategy of no fertility whatsoever.⁸⁷

The crucial determinant of this economic rationality is the intergenerational wealth flow, defined as "all the money, goods, services and guarantees that one person provides to another"⁸⁸ and in particular, its direction and magnitude. Where children represent a source of protection or wealth, then the flow will be from child to parent and consequently high fertility will be economically rational. However, when the flow is reversed, fertility immediately becomes economically irrational.

Having established the concept of wealth flows, Caldwell subsequently proceeded to construct a model which would demonstrate the applicability of his idea in terms of the fertility decline. Uncontrolled fertility is seen not merely as one aspect of pre-transitional society but as the central aspect of the cultural superstructure which maintains the relations of production. The study of the fertility decline is thus the study of the transformation of a familial mode of production into a capitalist productive system where labour power must be sold in the market.⁸⁹ This then calls for an examination of both the values and roles of children and the nature of the transformation in the cultural superstructure during the transition from production based upon the family unit to production achieved through an external labour market. On the other hand, Caldwell also claims that it is nonsensical to try and establish norms for behaviour while this transition is still in progress.⁹⁰

The importance of Caldwell's theories lies in their emphasis on the

social factors associated with the different modes of production, whereby economic rationality is only regarded as operating between certain limits, the boundaries of which are drawn by social constraints.⁹¹ They are also important in their insistence that rationality, as an element in the family formation process, is not the sole possession of a modern, low-fertility society. However, the major benefit of Caldwell's analyses is to be found in his concept of wealth flows which puts a sharper edge to at least some parts of the economists' view of children as representing consumer goods.

Lesthaeghe and Wilson agree with the previous theorist when they state that there will be a regional differentiation in the speed of the fertility decline dependent upon the particular economic situation of the household where, for example, the familial mode of production will be characterised by either a late or slow start to family limitation.⁹² However, Lesthaeghe and Wilson regard this economic-based argument as neither a sufficient nor a necessary precondition of the fertility decline, although they admit that it has an important role. The economic situation of the household is not a sufficient explanation, as the adoption of family limitation must be accompanied by a corresponding alteration in the ethical or moral climate, and neither is it a necessary factor, since elements of birth control are apparent in pre-transitional societies.⁹³ Lesthaeghe and Wilson argue that the pattern of fertility decline is dependent upon the prevalence of moral constraint so that where secularisation has taken place individuals will be in a position to control their fertility, in contrast to where the power of religion

remains strong and there is no room for reasoned decision-making. Therefore, in terms of the decline in fertility, the nature of the dominant religion becomes the dependent variable.⁹⁴

This major conclusion of Lesthaeghe and Wilson has received some support from the recent work carried out by Lockridge, using middle level data for rural deaneries (3-7 parishes) and harader (1-5 parishes) in Sweden.⁹⁵ Lockridge found that deaneries exhibiting low marital fertility were structurally dissimilar and that patterns of declining infant mortality were also different.⁹⁶ On the other hand, a weakened or secularised religious climate did correlate with those areas where marital fertility was low. Lockridge suggests that the evolution away from the familial mode of production may have encouraged an early advent of family limitation and moreover that secularisation was a necessary and sufficient feature for the adoption of fertility control.⁹⁷

The work of Lesthaeghe and Wilson and Lockridge may be seen as giving weight to Knodel's idea that family limitation was inextricably associated with a form of cultural innovation, where secularisation is an integral part of that process of change.⁹⁸

CONCLUSION

No attempt has been made within this chapter to provide either an exhaustive account of all theories relating to fertility and its decline nor a comprehensive coverage of those theoretical constructs which have been discussed. On the contrary, the material presented serves as a repertoire of sensitising devices to be borne in mind

and utilised, when relevant, in understanding family formation processes in Victorian Scotland.

Recent work on the fertility decline⁹⁹ has suggested that satisfactory explanations for the reduction of marital fertility can only effectively be achieved through micro-level studies, which provide the opportunity to come as close as possible to the sources of motivation. The motivation for a couple adopting fertility control in the past must always be inferred in a logical manner after having carefully considered the particular setting and circumstances and therefore the research design of the present thesis will permit investigation of motivational forces as well as attempting to assess their relative necessity or sufficiency in creating an atmosphere suitable for the fertility decline.

Chapter Five

FAMILY FORMATION IN TWO INDUSTRIAL TOWNS

Introduction

In this chapter the underlying patterns of family formation observable for Falkirk and Hawick will be outlined and certain of the similarities and differences will be explored. A comparison will firstly be made between the ironworkers and the textileworkers prior to a discussion of the shadow effect, where the data for the non-ironworkers and non-textileworkers will be introduced.¹

Initially the chapter will investigate the completed family size data for the iron and textile groups, since the literature continually makes reference to a major distinction between these two broad occupational groups with respect to their levels of fertility.² Subsequently, particular components of the observed differential in completed family size will be discussed, including such aspects as: the age at first marriage; the age of the mother at last birth; the length of the last birth interval; and the average length of all birth intervals.

Completed Family Size

As already discussed in Chapter Four, it is customary to regard families where the heads were engaged in heavy industry as exhibiting high levels of fertility, in direct opposition to those where the head worked in textiles and therefore it is immediately

necessary to establish whether any support for this hypothesis exists within the context of the Scottish data.

Table 5.1. Number₃ of Births per Family, Completed Reproduction Only.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	46	8.9	7.1	8.7	10.2	3.1
Text.	33	8.0	5.8	7.7	9.5	3.6

Source: Census/Birth Register Linkage.

The mean and median information on completed family size, presented in Table 5.1 shows quite clearly that the ironworkers in Falkirk had approximately one child more than the textileworkers from Hawick. The same basic pattern of fertility differentials is also found for women who had almost completed their reproduction.⁴

Table 5.2. Number of Births per Family, Married Women Aged 40-44 Only

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	31	8.8	7.0	8.8	9.8	2.8
Text.	14	8.1	6.25	8.0	10.2	3.95

Source: Census/Birth Register Linkage.

The completed family size of ironworkers, where the woman was last linked at age 40-44, indicates an excess according to the mean and the median, of 0.7 and 0.8 of a child respectively in relation to

textileworkers and since this pattern of fertility is so similar to that exhibited by those whose childbearing was complete, it was considered beneficial, in terms of the number of cases, to combine the information given in Tables 5.1 and 5.2. The relevant data is presented in Table 5.3.

Table 5.3. Number of Births per Family, Married Women Aged 40 and Over⁵

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	77	8.9	7.0	8.7	9.9	2.9
Text.	47	8.0	5.9	7.8	9.6	3.7

Source: Census/Birth Register Linkage.

Before proceeding further, it is necessary to note that at a considerably late stage in the life of the thesis a specific problem was revealed in the research design. Due to the complexity of the problem a full discussion and statistical examination has been set aside in an appendix to this chapter (see Appendix B). However, in the present context, a brief synopsis may be useful.

According to the research design, a couple was initially selected for study if the wife was aged thirty years or less in the 1871 census enumerators' books. However, according to this format, couples could have been married at the age of sixteen in every year from 1871 to 1857 and still be included in the sample groups whereas those marrying at thirty years could only have done so in 1871; thus, those marrying early had a greater chance of appearing in the

four groups of workers than those who married late (that is in their late twenties). A serious problem would then arise if the age of marriage distributions for the four groups of workers were found to be radically different, since this would then cast doubt on the validity of any observed fertility differentials.

In order to investigate this potential problem, the original data were reweighted on the basis that an inverse relationship existed between the age of marriage and the number of years over which a couple were at risk of being selected for study.⁶ The reweighted completed family size data based on this extremely severe assumption is presented in Table 5.4.

Table 5.4. Mean Number of Births per Family, Married Women Aged 40 and Over and Reweighted Data

	N	Mean
Iron	77	8.9
Reweighted Iron	77	8.7
Text.	47	8.0
Reweighted Text.	47	7.9

Source: Census/Birth Register Linkage.

It is apparent from the figures in Table 5.4 that, although the reweighted mean completed family sizes are smaller, not only is this difference rather slight, but importantly the overall differential between the iron and textile workers is maintained. Thus, where the difference between the original iron and textile workers' data was 0.9, the reweighted figures show a disparity of 0.8. Therefore, for

the purposes of the present study, it seems likely that the potential bias induced by the parameters of the research design does not significantly affect the observed differential in completed family size.⁸

Before turning to a careful consideration of the age of marriage distributions, it is worth providing some contextual information for the completed family size data. It is not, however, possible to make a straightforward comparison between the iron and textile workers' material and data from elsewhere, since the former calculations are only strictly applicable to a sub-set of the population.⁹

According to the 1911 Fertility Census of Scotland, the mean number of children per marriage for workers in iron manufacture was 6.26, in contrast with a figure of 5.14 for those engaged in wool and worsted manufacture.¹⁰ It is interesting to note a similar differential in completed family size as was observed in the case of the iron and textile workers. For women marrying in 1861-65 in the seven Pennsylvania anthracite counties studied by Haines, the average completed family size was 6.69.¹¹ Haines' data, however, does not discriminate between mining and metallurgical workers and other forms of employment in the areas which may have had very different levels of completed family size.

Age at First Marriage

As noted in Chapter Four, age at first marriage, especially for women, is of fundamental importance in any discussion of completed

family size, since the duration of marriage may affect the number of births by increasing or decreasing the time available for childbearing.¹² Alterations in the age of marriage are generally recognised within the literature as a traditional mechanism for controlling fertility.¹³ Moreover, the increased exposure to conception, brought about by any fall in the female age of marriage, occurs when a woman's fecundity is probably at its height, thereby greatly increasing the likelihood of a larger family size.¹⁴

In light of this, the age of marriage distributions for the iron and textile workers must be investigated in order to highlight any similarities or differences. In the same way as for the completed family size data, certain of the figures have been reweighted and these have been included in some of the tables where appropriate.

**Table 5.5 Age at First Marriage, Iron and Textile Workers,
1860-71 Males and Females, Completed Reproduction Only**

FEMALES	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	46	20.6	19.4	20.8	22.6	3.2
Text.	33	21.5	19.6	21.5	24.8	5.2
MALES						
Iron	46	22.8	21.8	23.0	24.7	2.9
Text.	31 ¹⁵	23.0	20.9	23.7	25.6	4.7

Source: Census/Birth Register Linkage.

Table 5.6. Age at First Marriage, Iron and Textile Workers, 1860-71, Males and Females Aged 40 and Over (including reweighted figures).

FEMALES	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	77	20.4	18.4	19.6	21.2	2.8
Rewtd.Iron	77	21.0	19.8	21.0	23.4	3.6
Text.	47	21.0	18.3	19.8	23.3	5.0
Rewtd.Text.	47	22.3	20.1	22.2	25.5	5.4

MALES

Iron	77	22.7	20.6	22.0	23.7	3.1
Text.	45	21.9	20.2	22.4	24.6	4.4

Source ; Census/Birth Register Linkage.

Looking first at the female age of marriage, it is apparent from Table 5.5 that a differential, albeit relatively small, exists between the wives of iron and textile workers. According to the mean and median figures, the textileworkers' wives were respectively 0.9 years and 0.7 years older at marriage and the upper quartile information suggests that a majority of women marrying textileworkers did so at a later age. On the other hand, the original data for all females linked to age 40 and over (shown in Table 5.6) show a reduction in this differential, especially on the part of the median, although a similar pattern of skew towards later marriage for textileworkers' wives is still evident.

Turning now to the male age of marriage, we can see that in general, men in both the iron and textile trades married two years older than the women, with males employed in the iron industry entering

marriage earlier than their counterparts in textile manufacturing, although the difference is rather slight. As in the female distributions, the upper quartile information indicates that more males in textiles were married later.

To sum up, certain age at first marriage differentials have been observed, especially as regards women, where a larger proportion of textileworkers' wives appear to be delaying marriage until their mid-twenties, as indicated by the higher upper quartile figures. In the reweighted female age of marriage data in Table 5.6, the entire distribution is skewed towards slightly later marriage. For instance, the mean and median values respectively indicate that marriage occurs 1.3 and 1.2 years later in the case of textileworkers' wives compared with ironworkers' wives. While the 'true' differential is unlikely to be as large as this, this factor may be helping to create variations in completed family size, observed in Tables 5.1 to 5.4; it is however, unlikely that the age of marriage differential could account for more than about forty per cent of the difference in the overall number of births. It should also be pointed out that in many respects, the age of marriage distributions are rather similar for both the iron and textile workers. Therefore, those variations which do exist may represent a contributory factor in bringing about the observed fertility differentials, but in no way do they constitute the major element.

Scottish Age at First Marriage

It is worth instituting a brief comparison between the national data for Scotland and the figures for the iron and textileworkers with regard to the age at first marriage, despite the limitations inherent in the latter data set. The relevant data is present in Table 5.7.

Table 5.7. Age at First Marriage, Scotland, 1871, Iron and Textile Workers 1860-71 (including reweighted female figures).

FEMALES

	Mean	Median
Scotland	25.0	23.7
Iron	20.4	19.6
Rewt. Iron	21.0	21.0
Text.	21.0	19.8
Rewt. Text.	22.3	22.2

MALES

Scotland	26.8	25.3
Iron	22.7	22.0
Text.	21.9	22.4

Source: Flinn et.al.(1977) Table 5.2.8; Table 5.6, above.

This tangential discussion is prompted by Flinn et. al.'s statement that the age of marriage was seldom low either at any time or in any part of Scotland.¹⁶ The data contained within Table 5.7 would appear to cast considerable doubt on this bold assertion. Even

allowing for the fact that the iron and textile material does not include those marrying for the first time after the age of thirty, which would inflate the mean figures, it is unlikely given the small numbers marrying even in the late twenties, that the medians would be affected to any significant extent.

The most probable cause of the observed divergence in Table 5.7 lies in the large proportion of the Scottish population still engaged in agriculture, especially in the Far North and Highland Counties, and who tended to marry rather late, thus increasing the mean and median figures. However, the age of marriage data for the two occupational groups of ironworkers and textileworkers helps to make clear that within this overall pattern of late marriage, certain distinct variations did occur and furthermore that these variants did not take place in any random manner but instead appear to be associated with particular circumstances. It is to the exact nature of these circumstances that our attention must now turn.

Explanations for Early Marriage

In Chapter Four six factors were put forward as having a potential effect on the age at first marriage¹⁷ and their relevance in the empirical setting will now be considered.

In the case of the ironworkers, it has already been shown that the sex ratios in Falkirk in the second half of the nineteenth century were heavily skewed in favour of males.¹⁸ Although this did not become particularly prominent until towards the end of the period, an imbalance in the sex ratio was apparent much earlier in certain

age groups, notably 15-19 and 20-24, and this may have encouraged earlier marriage on the part of females. On the other hand, this is unlikely to be a sufficient explanatory factor. If the minority presence of young women in the iron town was insufficient to explain their pattern of early marriage, then perhaps this fact in combination with the lack of opportunities for female labour-force participation may provide a more satisfactory explanation.¹⁹

The male occupational structure for those engaged in the iron industry in Falkirk was probably the predominant element in the low age of marriage for men, in that high earnings could be achieved at a young age in exchange for physical strength.²⁰ Added to this, the industrial expansion, evident in Falkirk in the 1860s, which gave rise to a favourable economic climate, would in all likelihood have acted to heighten expectations and consequently lower the age of marriage for those who felt themselves affected. Whether any local Falkirk tradition of early marriage existed must remain in doubt until the shadow effect has been discussed later in this chapter.

The influence of child employment on the age of marriage is somewhat problematic since detailed local information on this subject is scarce.²¹ In Falkirk there appears to have been little in the way of paid work, certainly for the very young and for girls, although some boys over the age of twelve were employed in the iron works and foundries.

In conclusion, the early marriages of ironworkers and their wives, compared both with the textile group and the national data, can be best understood in terms of a combination of the particular

structure of male employment, the position of the iron industry at that time, an imbalance in the sex ratio, and a low level of female labour-force participation.

Turning now to the textileworkers, the small disparity in the age of marriage between this group and the ironworkers, as evident in Table 5.6, should neither be misinterpreted or exaggerated, since when compared with the Scottish figures as a whole, the overall pattern requiring explanation is quite similar to that just discussed. However, if the end result is comparable, the means through which it is achieved were likely to have been different.

As in Falkirk, the sex ratios for the younger age groups in Hawick indicated an imbalance in favour of females and so, accordingly, this may be a contributory factor in the low marriage age of the minority group, namely the males.²² However, once again this proportional superiority did not become fully established until the 1870s and 1880s. The structure of male employment, whilst possibly not encouraging early marriage, since earnings were not particularly high, may not have acted as a disincentive either.

Importantly, there were considerable opportunities for women to work in Hawick and moreover this applied equally to married women in that the finishing of goods could often be performed in the home.²³ In this way then, the association of the availability of women's work and deferred marriage may have been eradicated by the further opportunity for paid work after marriage which allowed the juxtaposition of employment and childbearing. Along the same lines, there were also opportunities for child labour with regard to such

tasks as winding yarn or sewing stockings, which helped to reduce the costs of children and which otherwise might have induced the postponement of marriage. In the local economy of Hawick, the textile trade was still prosperous in the 1860s and expectations for the future were probably optimistic thus removing another theoretical barrier to early marriage.

It would seem, then, that the important features here, in explaining an early age of marriage, were the availability of married women's work, particularly in the domestic setting and low child costs, due to employment opportunities, with the underlying optimism of the local population being highly speculative. In addition, it has been shown that Hawick was unique in organising its knitting frames into small workshops,²⁴ although undoubtedly much work was also carried out in the home and consequently it seems possible to speculate that the family unit may have been best suited to this form of production, thus encouraging early marriage, with a view to initiating an early business partnership.²⁵

To sum up, a small differential was observed between the age of marriage distributions for the iron and textile groups, where the latter demonstrated a tendency towards slightly later marriage. On the other hand, the overall finding was the occurrence of comparatively early marriage on behalf of both groups. In both instances, an understanding of this particular strategy was reached primarily by investigating the particular workings of the local employment structures, so that in the case of Falkirk the iron industry was portrayed as requiring young, strong men and paying them accordingly, whilst simultaneously denying females the chance

of paid work. Conversely in Hawick, employment opportunities for married women and young children were often available in the home and this was seen as an incentive for early marriage, albeit in a different way.

Age of Mother at Last Birth

In the previous section a differential in the female age at first marriage, as seen in Tables 5.5 and 5.6, was put forward as contributing to an explanation of the fertility differentials observed in Tables 5.1 to 5.4. However, this age of marriage variation was shown to be slight and unable to account for the considerable disparity in completed family size. If the age at first marriage represents the beginning of a period characterised by exposure to conception, then it is desirable to locate a corresponding parameter to approximate the termination of this period. It is customary to take the age of forty five years as the end point of the reproductive period, although for present purposes this is insufficient since not only may childbearing have ceased some time before this, but variations in end points may be an important component of any fertility differential. For this reason, the exact ages at which mothers gave birth to their last child must be identified and analysed.

Investigations of the mother's age at last birth form part of the classical approach to identifying family limitation in the past; the assumption here is that the exercise of control over fertility is parity dependent. Historically, where this form of limitation

occurs, further conceptions were most probably avoided through abstention, or coitus interruptus, or perhaps abortion. Where a population or a particular group exhibit a low age for the mother at last birth, compared with other groups or populations, then this is seen as evidence for the existence of family limitation.

In the case of longitudinal data, a reduction in this age at last birth is regarded as symptomatic of the same practice being adopted at a particular time. For example in Haines' data, shown in Table 5.8 the age of mother at last birth within the Pennsylvania anthracite region is seen to decrease with the passing of each decade, although the same process is far less clear for the English and Welsh data shown in Table 5.9 where a degree of stability is present.

Table 5.8. Estimated Mean Age of Mother at Last Birth, Pennsylvania Anthracite Region, 1850-1900.

Census Year	Women Aged 45-49	Women Aged 40-44
1850	40.6	37.1
1860	39.4	36.7
1870	38.1	36.2
1880	37.5	36.0
1890	35.8	34.1

Source: Haines, 1979, Table IV - 27, p.136

Table 5.9. Estimated Mean Age of Mother at Last Birth, Durham and Easington and Merthyr Tydfil, 1851-1871.

Census Year	DURHAM & EASINGTON		MERTHYR TYDFIL	
	Women Aged 45-49	Women Aged 40-44	Women Aged 45-49	Women Aged 40-44
1851	39.5	36.7	38.6	37.7
1861	39.5	37.1	38.4	36.1
1871	37.6	37.1	38.7	37.2

Source: Haines, 1979, Table V-17, p 195.

However, it is worth noting how Haines arrived at these figures. For the England and Wales data a 10 per cent sample of census enumerators' books was used and the age of mother at last birth was subsequently estimated as the difference between the age of the mother and the age of the youngest child present. The same process was followed for the Pennsylvania data, although the sampling procedure is less clearly stated.²⁶ This calculation of the age of mother at last birth is wholly dependent upon the survival and presence of the last child born within the household and in my experience, both child mortality and children living elsewhere at the time of the census constitute two major sources of underestimation according to this strategy.

On the other hand, within the literature there is a paucity of precise data relating to this subject, especially with regard to occupational variations and therefore despite the obvious drawbacks

of Haines' data the information in Tables 5.8 and 5.9 is given solely for the purposes of enabling at least some broad comparison.

Table 5.10. Age of Mother at Last Birth, Completed Reproduction and Women Aged 40 or Over Experiencing Last Birth in the Period 1880-91.

Completed Reproduction

	N	Mean	Lower Quartile	Median	upper Quartile	Inter Q Range
Iron	46	39.2	36.9	39.1	41.1	4.2
Text.	33	39.9	37.6	39.8	41.7	4.1

Women Aged 40 or Over

Iron	77	39.1	36.8	39.2	41.2	4.4
Text.	47	39.2	37.2	39.6	41.4	4.2

Source: Census/Birth Register Linkage.

As observed in Table 5.10, the ironworkers' wives were slightly younger on the occasion of their last births though the difference is probably not large enough to indicate that family limitation had been adopted by this group; indeed, the high age of mother at last birth data for both groups in this table, as compared with the figures in Tables 5.8 and 5.9 (although possibly not surprising given the formulation of Haines' data) would suggest that neither group were using this strategy for fertility control. On the other hand, it is generally recognised that this particular indicator is not sufficient to uncover the existence of family limitation and

that the length of the last birth interval should also be studied.

To sum up, the parameters of the respective reproductive periods have been established through investigating the age at first marriage and the age of the mother at the last birth. If this information is subsequently combined, by subtracting the mean female age at marriage in Table 5.5 from the mean age of mother at last birth in the Completed Reproduction section of Table 5.10, then it becomes possible to compare the average length of a reproductive career. This length is 18.6 years for the ironworkers and 18.4 years in the case of the textileworkers and since those women who married an ironworker gave birth to, on average, one more child than those who married textileworkers, it is obvious that something must have been happening within their reproductive spans to create this differential.

Last Birth Interval

The interval between the penultimate and last births, as measured in months, has provided a useful implement with which to thresh out some of the fertility patterns exhibited by either different groups or the same group across time.²⁷ Where this interval is comparatively long, or lengthening over time, it is usually suggested that family limitation is either already in existence or increasing in use. Once a particular number of children has been achieved, the decision to avoid further pregnancies may be taken, although a breakdown in the means of control may subsequently occur and a further birth may result.²⁸ Under these circumstances, the last birth interval may be unusually long, as compared with others

within the same reproductive career, taking into consideration the lengthening which occurs naturally in the birth intervals as age increases.

Table 5.11. Length of Last Birth Interval, in Months, Completed Reproduction Only, Women Experiencing Last Birth in Period 1880-91.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	46	36.2	25.2	31.0	41.0	15.8
Text.	33	49.1	26.8	32.0	62.8	36.0

Source: Census/Birth Register Linkage.

The last birth interval data, as presented in Table 5.11, indicate that a greater proportion of textileworkers had unusually long gaps between their penultimate and last births. While the medians are rather similar, the mean for the textileworkers is much higher and if we consider the overall shape of the two distributions, then we can see that the one for the textileworkers is skewed. This same pattern is evident in Table 5.12. Furthermore, given that last birth intervals lengthen as marriage duration increases, the ironworkers' intervals appear to be rather short in comparison with the intervals exhibited by the textileworkers which are quite long. From the evidence in Tables 5.11 and 5.12 it is possible to suggest that certain of the textileworkers were probably operating a fertility strategy in which the limitation of completed family size played a major part.

Table 5.12. Length of Last Birth Interval in Months, Married Women Aged 40 and Over, 1880-91.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	77	35.8	24.4	29.5	47.9	18.5
Text.	47	47.1	24.6	39.0	55.2	30.7

Source: Census/Birth Register Linkage.

In order to gauge whether or not the mean length of the last birth intervals in Tables 5.11 and 5.12 are particularly unusual, a comparison may be made with the data from some German villages studied by Knodel and presented in Table 5.13.

Table 5.13. Mean Last Birth Interval, German Villages, 1850-74 and 1875-99.

	1850-74	1875-99
Grafenhausen	46.9	52.1
Herbolzheim	43.1	44.2
Oschelbronn	37.8	37.9
3 Bavarian Villages	38.2	36.7
4 Waldeck Villages	43.1	44.7
Middels	48.3	48.4

Source: Knodel (1979a) Table 7.

It is apparent that the ironworkers' mean figure is similar to the results for Oschelbronn and the three Bavarian villages, whereas the

textileworkers' last birth intervals are more comparable in length to those for Grafenhausen and Middels. Knodel suggests that the long last birth interval for Grafenhausen, which also lengthens over time, is indicative of a population exerting control over their fertility chiefly by employing a stopping procedure once a particular family size has been reached.²⁹

This comparative evidence therefore points to a possibly significant finding, in that it has shown certain of the textileworkers exhibiting very long last birth intervals; this raises clearly the possibility that family limitation was being practiced by at least some of these workers and their wives. On the other hand, it has been claimed that prolonged breastfeeding may radically increase the length of birth intervals and this would apply equally to the last birth interval. If this were so however, it would be logical to expect all birth intervals to be long in the same way as the last; the discussion, therefore, turns to a consideration of birth intervals in general where the subject of breastfeeding will be taken up again.

All Birth Intervals

The two previous indicators of fertility control, the age of mother at last birth and the length of the last birth interval, are only capable of suggesting the existence of family limitation, that is stopping behaviour. This was the classical approach to studying fertility in the past until Dupaquier and Lachiver suggested that a sole concentration on this area of family limitation was inadequate

in detecting alterations in the overall patterns of childbearing which could also be described as fertility regulation. Instead they proposed that the emphasis should shift to investigating attempts at increasing the intervals between all births, thus seeking to uncover any birth spacing strategies as evidence for parity-independent behaviour.³⁰

While the basic idea posited by Dupaquier and Lachiver remains worthy of attention, the same cannot be said for their technique which has been shown to be defective on several counts.³¹ For example, their calculation of 'the number of confinements before age 40', it has been pointed out by Knodel, includes not only the interval between the last confinement before age 40 and age 40 itself but also women who have only one birth or no births at all before age 40. In this way then, the Dupaquier - Lachiver model of birth spacing will be affected by sterile and sub-fecund members of the population. Moreover, any average birth intervals observed to be long or lengthening may in fact only be a reflection of an increasing last birth interval, where the final birth occurs well in advance of age 40. In other words, what may seem like birth spacing, according to Dupaquier and Lachiver, will in actual fact be evidence of family limitation. In light of Knodel's criticisms, the Dupaquier - Lachiver model will not be used here in the investigation of birth spacing.

In order to examine any similarities or differences in spacing behaviour between iron and textile workers, the distribution of the average lengths of all birth intervals, with the exclusion of the

last, has been calculated. The results are presented in Table 5.14.

Table 5.14. Length of All Birth Intervals in Months, Excluding the Last, Completed Reproduction Only.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q Range
Iron	46	26.2	20.9	24.8	29.2	8.3
Text.	33	27.9	21.5	25.2	30.3	8.8

Source: Census/Birth Register Linkage.

The textileworkers, according to the mean, have an extra 1.7 months between successive births, although in reproductive terms the difference is rather slight. In general for both occupations the mean length of birth intervals, excluding the last, is slightly more than two years.

If we compare the mean data from Table 5.14 with similar information from Knodel's German villages, provided in Table 5.15, then we can see that the iron and textile workers tend to exhibit relatively long average birth intervals, since only the two examples of Middels and the four Waldeck villages come close to the figures in Table 5.15. In some respects, this finding is rather surprising, since one might have expected the iron and textile groups, biased as they are slightly towards the younger marrieds, to have exhibited a high proportion of short birth intervals early in their reproductive careers, which in turn would have held down the length of all birth intervals. On the other hand, the methods of calculation may differ.

Table 5.15. Length of All Birth Intervals in Months, Excluding the Last, German Villages.

	1850-74	1875-99
Grafenhausen	20.9	23.1
Herbolzeim	21.2	21.9
Oschelbronn	21.0	19.1
3 Bavarian Villages	18.6	19.0
4 Waldeck Villages	24.8	24.5
Middels	27.3	25.3

Source: Knodel, 1979, Table 7.

The length of all birth intervals in Table 5.14 was calculated from the length of period between marriage and last birth (in months), divided by the total number of births less one. In contrast, Knodel gives little information as to how the figures in Table 5.15 were calculated. It is not safe to assume that similar methods may have been followed, since there are alternatives. For example, although the period between marriage and the last birth may be taken to represent the amount of time spent at risk of conception, it is generally accepted that exposure to conception may have, for some, begun prior to marriage and in which case any variations in the prevalence of premarital pregnancy may also lead to variations in the average length of birth intervals. This could arise where a group exhibiting high levels of premarital pregnancy were compared with another group whose opportunity for conceiving began simultaneously with marriage but who managed to achieve the same average completed family size. In this situation, the former group

would be observed as having shorter average birth intervals than was in fact the case and furthermore, the latter group, with their observed longer intervals, might be regarded as indulging in a limited amount of birth spacing.³²

The existence of deliberate birth spacing strategies in the early stages of the fertility decline is then extremely difficult to infer let alone prove and any serious attempt would require detailed demographic data on a number of separate issues.³³ For example, the necessity of fertility data, age of marriage material and information as to the prevalence of premarital pregnancy has already been indicated, added to which would be information regarding infant mortality together with more medically oriented evidence concerning the incidence of miscarriage and various breastfeeding practices. It is generally accepted that lactation acts to inhibit conception by prolonging amenorrhea, although this protection against pregnancy will be affected by any interruption, for example if the baby dies with ovulation restarting soon afterwards.³⁴

Historically, there is evidence that the length of time spent breastfeeding varied from place to place and moreover this has been suggested as a possible cause of variation in average birth intervals.³⁵ The effects of breastfeeding on fertility patterns have been the subject of considerable debate within the literature and although it is now generally accepted that prolonged breastfeeding will increase the length of the subsequent birth interval, it has proved virtually impossible to assemble for any

area of the Western world anything like a satisfactory picture of where and when breastfeeding was both widely used and prolonged.³⁶ Within the parameters of the present thesis, it has not been possible to obtain any information as regards breastfeeding practices in either Falkirk or Hawick and therefore, although acknowledgement is made of the likely effects, no analysis along these lines may be made.

To sum up, the present investigation of birth intervals has shown that a small difference exists in the average length of birth intervals between the iron and textile workers. However, as a measure of birth spacing, this particular indicator is too crude and consequently subtle differences in the fertility patterns of the two occupational groups will undoubtedly have been obscured. For example, the birth intervals occurring towards the end of a woman's reproductive span are generally recognised as longer than those between earlier births, due to greater fecundity when younger, and yet the average birth interval data cannot take account of this phenomenon. Hence the issue of birth spacing will be returned to in Chapter Seven where more sophisticated techniques will be introduced.

So far in this chapter, only the various patterns of reproductive behaviour have been discussed, with little mention being made of any underlying reasons concerning particular elements within these patterns. In other words, the focus has been descriptive rather than analytic. Rather than trying to provide parts of explanations at this juncture, where our investigations are as yet incomplete,

the overall conclusions will be left to a final chapter.

The Shadow Effect

In this second part of the chapter, the data referring to the non-ironworkers and non-textileworkers from each of the respective towns will be introduced, with a view to studying the effects that the behavioural patterns of the predominant occupational group may have had on those other workers not directly involved in that specific form of employment.³⁷ The same structure will be followed as in the first part of the chapter, where the initial comparison of completed family size will be followed by an investigation of firstly the age of marriage, secondly the age of mother at last birth, thirdly the last birth interval and finally, all other birth intervals.

The mean completed family size of ironworkers has been shown, in Table 5.1, to be almost one child greater than that of the textileworkers and it is further apparent from Table 5.16 that this disparity in favour of the ironworkers also applies to the two newly introduced groups. Both the mean and median figures in Table 5.16 indicate, in most cases, a discrepancy of at least one child between the completed family size of those working in iron and the other three groups.

Table 5.16. Number of Births per Family, Completed Reproduction Only.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q Range
Iron	46	8.9	7.1	8.7	10.2	3.1
Non-Iron	16	7.9	6.7	8.0	8.8	2.1
Text.	33	8.0	5.8	7.7	9.5	3.6
Non-Text.	32	7.8	5.4	7.2	9.5	4.1

Source: Census/Birth Register Linkage.

However, since the number of cases upon which some of the calculations in Table 5.16 are based is quite low, it may be worthwhile also to consider in more detail those family units where the wife was between forty and forty four years old, when the last information became available for record linkage. The relevant data is presented in Table 5.17 together with the reweighted mean figures.

Table 5.17. Number of Births per Family, Married Women Aged 40 and Over.

	N	Mean	Rewt. Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	77	8.9	8.7	7.0	8.7	9.9	2.9
Non-Iron	31	8.4	8.3	6.6	8.2	9.8	3.2
Text.	47	8.0	7.9	5.9	7.8	9.6	3.7
Non-Text.	44	8.4	8.0	5.7	8.0	10.0	4.3

Source: Census/Birth Register Linkage.

Probably the most immediate impression gained from Table 5.16 is the large difference between the ironworkers and the other three groups, whereas in Table 5.17 it is the comparatively low figures for the completed family size of the textileworkers which equally stand out. On the other hand, a shadow effect is, in either case less easily discernible. Indeed, it is only the lower ends of the distributions, as indicated by the lower quartiles in Tables 5.16 and 5.17, which could conceivably be used as evidence of the shadow in operation, with certain of the textileworkers and non-textileworkers having smaller families than is conversely the case for the two groups from the iron town. The reweighted mean data might suggest the existence of a shadow effect in Hawick but this is hardly conclusive particularly since the 'true' means presumably lie somewhere between the mean and the reweighted mean figures.

Table 5.18. Age at First Marriage, Completed Reproduction Only.

Females	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q Range
Iron	46	20.6	19.4	20.8	22.6	3.2
Non-Iron	16	20.7	20.2	21.2	22.2	2.0
Text.	33	21.5	19.6	21.5	24.8	5.2
Non-Text.	32	21.9	20.3	22.5	23.6	3.3
Males						
Iron	46	22.8	21.8	23.0	24.7	2.9
Non-Iron	16	23.4	22.0	23.7	26.5	4.5
Text.	31	23.0	20.9	23.7	25.6	4.7
Non-Text.	30	23.3	21.8	23.0	25.8	4.0

Source: Census/Birth Register Linkage

Turning now to the age of marriage, the mean ages at first marriage for females, as presented in Table 5.18, indicate that a possible shadow effect was operating, since the figures for the two dominant occupational groups are approximately reflected by their respective control groups. There is further evidence for this in the female age of marriage data in Table 5.19 and moreover in both Tables 5.18 and 5.19 the upper quartile information for females shows some interesting parallelisms.

Table 5.19. Age at First Marriage, Married Women Aged 40 or Over

Females	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q Range
Iron	77	20.4	18.4	19.6	21.2	2.8
Reweight		21.0	19.8	21.0	23.4	3.6
Non-Iron	31	20.6	18.8	20.2	21.4	2.6
Reweight.		21.0	20.1	21.5	22.8	2.7
Text.	47	21.0	18.3	19.8	23.3	5.0
Reweight.		22.3	20.1	22.2	25.5	5.4
Non-Text	44	21.0	18.7	20.3	22.2	3.5
Reweight.		21.5	20.2	22.3	23.6	3.4
Males						
Iron	77	22.7	20.6	22.0	23.7	3.1
Non-Iron	31	22.7	20.0	21.9	24.3	4.3
Text.	45	21.9	20.2	22.4	24.6	4.4
Non-Text.	42	23.3	20.6	22.0	25.1	4.5

Source: Census/Birth Register Linkage

In Table 5.19 the reweighted female age of marriage information is also included and the median data, in particular, demonstrate a marked similarity in the locality-specific patterns. It is therefore suggested that although the actual difference between the female age of marriage patterns is small, in Falkirk as compared with Hawick, there is some evidence for the possible existence of a shadow effect. However, as far as the male age of marriage is concerned, no particular pattern emerges and thus no shadow or locality effect may even be suggested.

Let us turn now to a re-examination of certain aspects of the reproductive behaviour discussed earlier, in terms of a comparison between iron and textile workers, but now investigated in an attempt to detect possible shadow effects in operation. In the case of the age of mother at last birth data (presented in Tables 5.20 and 5.21) the potentially most interesting result is in Table 5.20, where the mean and median figures indicate that wives of non-ironworkers gave birth to their last child at least one year earlier than the wives in any other group. However, in this table the relevant number of cases is low, making random error a distinct possibility, and in fact when the number of cases is increased, as in Table 5.21, this disparity is almost completely removed. In terms of a shadow effect, it is difficult to see any clear pattern emerging from the age of mother at last birth data.

Table 5.20. Age of Mother at Last Birth, Completed Reproduction Only, Women Experiencing Last Birth, 1880-91.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q Range
Iron	46	39.2	36.9	39.1	41.1	4.2
Non-Iron	16	38.0	35.5	38.0	39.8	4.3
Text.	33	39.9	37.6	39.8	41.7	4.1
Non-Text.	32	39.5	35.3	40.0	42.0	6.7

Source: Census/Birth Register Linkage**Table 5.21. Age of Mother at Last Birth, Married Women Aged 40 and Over, Experiencing Last Birth, 1880-91.**

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q Range
Iron	77	39.1	36.8	39.2	41.2	4.4
Non Iron	31	38.6	35.9	39.3	40.4	4.5
Text.	47	39.2	37.2	39.6	41.4	4.2
Non Text.	44	39.6	35.7	40.2	42.0	6.3

Source: Census/Birth Register Linkage.

Let us turn now to a consideration of the length of the last birth interval. In the earlier discussion of the iron and textile workers, a variation in the length of this interval was regarded as an important indicator of the possible existence of family limitation. Moreover a significant difference was observed in that more of the textileworkers exhibited rather long last birth intervals.

According to the mean and median figures in Table 5.22, there appears to be little shadow effect, with the most noteworthy feature still being the high mean value exhibited by the textileworkers. Even in Table 5.23, the means and medians have not firmly established themselves into two opposite camps, each representing a separate town, although there is a degree of evidence to suggest that this may be happening. In contrast, firmer evidence of a possible shadow effect may be located in both Tables 5.22 and 5.23 if one notes that the upper quartile information clearly indicates that those wives in the textile and non-textile groups who are at the upper ends of the distributions have much longer last birth intervals. This suggests that the same factors as operated to lengthen birth intervals among the textile families were also operating in the families of non-textileworkers. If these factors were indeed some form of deliberate fertility regulation, then one may reasonably conclude that these two patterns of behaviour were not unconnected and were in fact the outcome of a shadow effect.

Table 5.22. Length of Last Birth Interval in Months, Completed Reproduction Only.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q Range
Iron	46	36.2	25.2	31.0	41.0	15.8
Non-Iron	16	36.6	22.5	35.5	44.0	21.5
Text.	33	49.1	26.8	32.0	62.8	36.0
Non-Text.	32	38.4	23.5	29.0	50.0	26.5

Source: Census/Birth Register Linkage.

Table 5.23. Length of Last Birth Interval in Months, Married Women Aged 40 and Over.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q Range
Iron	77	35.8	24.4	29.5	42.9	18.5
Non-Iron	31	35.3	23.9	34.5	44.2	20.3
Text.	47	47.1	24.6	39.0	55.2	30.7
Non-Text.	44	38.4	23.5	36.0	50.0	26.5

Source: Census/Birth Register Linkage.

Finally, let us consider all birth intervals, with the exception of the last, from the point of view of detecting a shadow effect. The relevant data is presented in Table 5.24 and it is interesting to note that the mean figures show the textileworkers and non-textileworkers to have about an extra month's interval between successive births. However, this is the only possible evidence here of a shadow effect and the differences are so slight as to cast considerable doubt on this line of argument. On the other hand, this particular indicator of birth spacing has already been castigated as being too crude to provide a satisfactory analysis of this element of reproductive behaviour and consequently, certain shadow effects influencing particular aspects of birth spacing may have been passed over. This problem is analysed again with more sensitive data in Chapter Seven.

Table 5.24. Length of All Birth Intervals in Months, Excluding the Last, Completed Reproduction Only.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q Range
Iron	46	26.2	20.9	24.8	29.2	8.3
Non-Iron	16	26.5	22.0	25.0	30.0	8.0
Text	33	27.9	21.5	25.2	30.3	8.8
Non-Text	32	27.3	22.0	24.8	28.9	6.9

Source: Census/Birth Register Linkage

Conclusion

The decision to create the opportunity for studying a possible shadow effect within the original research design can now be fully justified in that although the effects observed are small, certain elements within the various patterns of reproductive behaviour have been discovered which at least give some credence to the initial hypothesis. Moreover, if no shadow groups had been used, the effect would have been to place occupationally associated characteristics to the fore in any explanation of marriage or fertility strategies to the exclusion of all else.

In particular, the consideration of a shadow effect allows the inclusion and the discussion of the potential significance of reference group pressure, where certain forms of social action embarked upon by one group may influence the behaviour of others in

such a way as to produce a similar result. In the same manner, certain normative prescriptions, operating within a specific localised setting, may have originated from the demands or opportunities inherent in a particular dominant industry, but have since become translated into standard forms of behaviour with much wider significance. For example, some individuals in the two control groups are likely to have been employed at some point in the dominant industry in their locality, particularly in Hawick where a large proportion of women, including non-textileworkers' wives, will have spent at least a part of their lives associated in some way with textile manufacturing.

In this way it begins to become clearer that the mechanisms for creating a shadow effect may easily have been present in both Falkirk and Hawick, although the exact workings of this mechanism remain to be discussed.³⁸ Moreover, there is some evidence that clear locality effects did exist in the case of the age of marriage and the length of the last birth interval and the suggestion has been made that this is perhaps the result of a shadow effect. These points are explored further in later chapters.

Chapter Six

ILLEGITIMACY AND PRENUPTIAL CONCEPTION

Introduction

In the previous chapter certain differences and similarities between the marriage patterns and reproductive behaviour exhibited by ironworkers and textileworkers were studied in an attempt to explain their overall fertility differential. In order to further examine the family formation process, we shall now broaden the field of enquiry and focus attention on prenuptial conceptions and premarital sexual relations. In this way, certain other similarities and differences between the two major occupational groupings along with their control groups may become more apparent. For example, if significant differences in extramarital or prenuptial conceptions were discovered, then this may form part of an explanation for the observed fertility differential.

It is important to note that prenuptial conception was by no means an odd or unusual occurrence in nineteenth-century Scotland, as indicated by the following comments of two ministers in rural Lanarkshire in the late 1850s.

"I really do not remember when I last married a young woman who was not in the family way."

"I seldom, if indeed ever, perform the service where it should not have been performed long before." 1

In support of this sentiment, the registrar for the parish of Crail

in Fife described this phenomenon of 'antenuptial unchastity' as 'quite proverbially the fashion' in 1863² and in an attempt at quantification, Smout has estimated that in the woollen manufacturing towns of Scotland the figure for prenuptial conception was approximately thirty per cent.³

However, in general the occurrence of prenuptial pregnancy was neither new by nineteenth-century standards nor unique to Scotland. Hair's work on bridal pregnancy in rural England has indicated that about one fifth of all brides in the period 1540-1700 were pregnant on their wedding day and further that this figure increased to two fifths by 1700-1820.⁴ For nineteenth-century England, Laslett has put forward a figure as high as forty per cent for premarital conceptions.⁵ In other words, the phenomenon was widespread in the past and consequently any thorough investigation of family formation processes should wherever possible include an examination of this topic.

Prenuptial Conception

In this section we shall discuss the occurrence of prenuptial conception in relation to the four groups of workers from the two Scottish towns. As a rule in historical demography an interval of eight and a half months or less between marriage and the first birth is regarded as indicative of a prenuptial conception,⁶ although some prefer a shorter interval of seven months or less.⁷ Here we shall use the former method of calculation.

Table 6.1. Percentage of Prenuptial Conceptions, The Four Groups, 1858-1871. 8

Groups	Number of Prenuptial Conceptions	Number of Families	Percentage of Families with Prenuptial Conceptions
Iron	56	119	47.5
Non-Iron	31	71	43.6
Text.	44	87	50.5
Non-Text.	28	82	34.1

Source: Census/Birth Register Linkage

The figures for family units within the groups of workers from Falkirk and Hawick, where the bride was already pregnant at marriage, are given in Table 6.1. The level of prenuptial conceptions was comparatively high for each group, with the exception of the non-textileworkers, with almost one half of the married women having a child within eight and a half months of marriage.⁹

There was little difference between the ironworkers and the textileworkers, with only four per cent more of the latter group being pregnant on their wedding day. If nearly half of all brides in the four groups conceived out of wedlock, then it may be of interest to pursue this line of enquiry and calculate how soon after marriage the remaining women gave birth. Thus, a cumulative percentage of the lengths of interval between marriage and first birth has been assembled and the results are presented in Table 6.2.

Table 6.2. Cumulative Percentage of Lengths of Interval Between Marriage and First Births, 1858-1875.

Length of Interval in Months	Iron	Non-Iron	Textile	Non-Textile
0-4	38.0	29.2	34.5	22.0
5-8.5	47.5	43.6	50.5	34.1
5-9	56.2	50.0	55.2	41.5
10-14	83.5	79.2	80.5	73.2
15-19	94.2	90.3	85.1	84.2
20-24	98.3	94.5	93.1	91.5
25-29	99.1	94.5	96.5	96.4
30-34	99.1	97.3	96.5	98.8
35-39	100	100	100	100

Source: Census/Birth Register Linkage.

According to the figures in Table 6.2, in all cases, except the non-textileworkers, over three-quarters of family units had experienced their first birth before fourteen months of marriage had elapsed and after two years of marriage over ninety per cent of all couples had experienced at least one birth. It is interesting to note that a larger proportion of the workers in both iron and textile manufacture had a child within four months of marriage, in contrast with the two control groups. One possible explanation here is that these groups had a longer period over which marriage could have been anticipated, through easier access to economic independence upon which marriage may have at least in part been based.¹⁰

The information contained within Tables 6.1 and 6.2 therefore demonstrates that the phenomenon of prenuptial conception was indeed widespread in both Falkirk and Hawick throughout the 1860s. In both towns the likelihood was that every second bride would already be pregnant, thus indicating the existence of a substantial level of premarital sexual activity. However, whether this practice arose from a pervasive ethos of unfettered sexual gratification or from sex with marriage most definitely in mind is a matter requiring more complex debate.

For example, the high level of prenuptial conception suggests that coitus was quite permissible within the courtship patterns of those from all four groups, with the possible exception of the non-textileworkers. However, acceptability may only have been achieved at a particular stage of courtship or under specific circumstances, for instance after marriage had been proposed and agreed or if marriage was easily entered. It is also worth posing the question as to whether premarital sexual intercourse was experienced for pleasure alone or whether an element of fertility testing might also have been operating.

Gaunt has suggested that in certain textile trades the family unit, consisting of husband, wife and children of working age, was the ideal work unit and consequently, this may have been a factor in encouraging early marriage and early childbearing.¹¹ Furthermore, Smout makes reference to the importance of children for agricultural labourers or hinds in the Borders of Scotland and believes that premarital sex was commonplace, although it was nearly always conducted with marriage in mind.¹² In both these examples, the

authors speculate that premarital intercourse may have represented a fertility-testing strategy designed to obviate the tragedy of marrying a barren woman.

Within the present research context, the existence of at least some children was most important for the textileworkers and therefore the fertility-testing model of prenuptial conception would logically apply most strongly to the wool framework knitters of Hawick. If this was the case, however, then the number of pregnant brides might be expected to have been much higher. Alternatively then, since the figures for prenuptial conception for at least three of the groups of workers were so similar, it would seem more realistic to seek explanations for premarital sexual activity based more on common factors rather than particular situations.

Having discovered little difference in the occurrence of prenuptial conception between the ironworkers and the textileworkers, we must now find out whether marriage followed with the same degree of regularity in both groups. We have seen that almost one half of our brides were pregnant and therefore that a good many potential illegitimate births were being prevented; however, did premarital sex, where conception occurred, always lead to marriage or did illegitimacy sometimes result and if so, was there any distinction between the four groups of workers in this respect? For example, if marriage was more easily entered for some then this may have been a crucial element in either pre-empting or leading to an illegitimate birth.

Illegitimacy

A number of the couples within our four groups of workers had borne illegitimate children and these were located and recorded by means of retrospective searching through the birth registers. However, as a result of the present research design, all the couples experiencing a birth out of wedlock subsequently became married to each other. Furthermore, according to Scots Law, the marriage of the parents acted to legitimise any previously illegitimate children. It is thus interesting to wonder whether this peculiarity of illegitimacy in Scotland may have influenced the manner in which courting couples perceived an illegitimate birth, a prenuptial conception or indeed premarital sexual activity in general. If this were so, and there is no hard evidence for or against it at this stage, then the possibility for giving an illegitimate child legitimate status at some point in the future may have encouraged couples to indulge in earlier premarital sexual activity than might otherwise have been the case.

If we turn now to the data in Table 6.3, we can see that the textileworkers have a much larger number of illegitimate births than the ironworkers with almost one third of textileworkers' families experiencing such an event, in contrast to only about one-twelfth of the ironworkers' families. However, neither pattern of illegitimacy would seem to apply to the iron or textile towns as a whole, as evidenced by the high figure in Table 6.3 for the non-ironworkers and the low proportion for the non-textileworkers. Given the significantly non-random nature of these differences, it seems plausible to suggest that occupationally-specific factors may

Table 6.3. Families Experiencing an Illegitimate Birth, The Four Groups, Married Women Aged 40 or Over, 1858-1871.

Groups	Number of Illegitimate Births	Number of Families	Percentage of Families
Iron	6	77	7.8
Non-Iron	8	31	25.8
Text.	14	47	29.8
Non-Text.	4	44	9.1

Source: Census/Birth Register Linkage.

have been operating to cause the difference in patterns of illegitimacy between the two groups of workers in the predominant industries. It is interesting to note that there was little difference between the total percentage of families experiencing an illegitimate birth in the iron and the non-iron groups taken together, as compared with the same figures for the textile and non-textile workers, since one of the two groups from each of the towns was high and the other was low. Importantly, the relationship was inverse for each location. Therefore, micro-level data has again demonstrated its capacity to highlight differences within populations which otherwise would remain obscured. In order to cast further light on this issue, we shall firstly present certain illegitimacy data for both towns, in the second half of the nineteenth century, in an attempt to explore similarities and differences and secondly, we shall seek to develop an explanation for the differential in the experience of illegitimacy as observed in Table 6.3.

Illegitimacy Ratios

The incidence of illegitimacy in the nineteenth century is still most commonly calculated by the number of illegitimate births as a proportion of every one hundred live births which gives the illegitimacy ratio. However, there are certain drawbacks inherent in this measure, namely that the ratio remains wholly dependent upon the number of legitimate births occurring in a given population, whilst simultaneously being unable to control for variations in the number of unmarried women of reproductive age and who were thus at risk of having an illegitimate child. On the other hand, despite these deficiencies, the illegitimacy ratio is widely used, due primarily to its ease of calculation from the published birth statistics available for the nineteenth century.

Table 6.4. Illegitimacy Ratios, Falkirk and Hawick, Five Year Intervals 1860-89 (Number of illegitimate births per 100 live births).

	1860-64	1865-69	1870-74	1875-79	1880-84	1885-89
Falkirk	8.2	8.0	8.6	6.5	6.2	5.2
Hawick	13.7	11.8	10.3	12.0	10.5	10.3

Source: RG Annual Reports 1858-60, RG Quarterly Returns 1861-90.

As observed in Table 6.4, there is a basic disparity between the illegitimacy ratios for Falkirk and Hawick and this is maintained over time, despite an overall pattern of decline. In order to provide some contextual evidence, the illegitimacy ratios for

Scotland and certain of its counties including Roxburgh and Stirling in which Hawick and Falkirk are respectively located, are presented in Table 6.5.

The data in Table 6.5 indicate the wide regional divergence in the incidence of illegitimacy which occurred in Scotland throughout the second half of the nineteenth century. For example the north-east counties of Aberdeen and Banff together with Wigtown in the south-west exhibited exceptionally high levels of illegitimacy, in stark contrast to Ross and Cromarty where illegitimate births were much less common. The figures for Stirling were continually below the average for the country as a whole, whereas those for Roxburgh were persistently greater.

Generally, the illegitimacy ratios for the towns of Falkirk and Hawick, seen in Table 6.4, are of an equal magnitude and follow the same pattern as those for their respective counties. In other words, Falkirk's level of illegitimacy falls just below the average for Scotland, as compared with the experience of Hawick which places it slightly above the national figure. From the data so far presented in Table 6.4, we have seen that Hawick had a higher illegitimacy ratio than Falkirk and this was supported by the greater proportion of textileworkers' families in Table 6.3 who experienced an illegitimate birth. Why should illegitimacy therefore be more common Hawick?

One approach might be that illegitimate births in Hawick were the unintended consequences of marriages which were fully anticipated but which were for a time frustrated due possibly to a lack of

Table 6.5. Illegitimacy Ratios by Selected Counties, 1855-90.

	1855-60	1861-65	1866-70	1871-75	1876-80	1881-85	1886-90
Aberdeen	15.25	15.63	15.08	14.65	13.91	13.57	13.37
Banff	15.39	16.62	16.61	16.53	16.67	13.62	15.31
Midlothian	7.75	9.24	9.03	8.04	7.53	7.58	7.59
Ross	3.84	4.24	4.86	4.57	4.54	4.78	5.08
Roxburgh	10.60	11.57	11.62	11.08	10.89	10.67	10.34
Stirling	8.01	8.26	8.50	7.54	6.50	6.67	6.54
Wigtown	13.84	15.65	16.67	15.79	15.50	16.25	16.80
Scotland	8.74	9.79	9.85	9.09	8.49	8.27	8.04

Source: Flinn et. al. (1977) Table 5.4.1.

economic independence.¹³ Alternatively, the courtship process itself may have been delayed for a similar reason. From a slightly different angle, marriage may have been delayed deliberately, perhaps in an attempt to limit the ultimate family size, although due to some mishap an illegitimate birth occurred. However, before exploring these hypotheses more fully, let us examine illegitimacy by one further means.

Illegitimate Fertility Rates

The illegitimacy ratio, as already pointed out, cannot account for differences in the number of women at risk of having illegitimate births and consequently variations in the proportion of local populations falling into the sexually active and at risk groups, but who remain unmarried, may influence and indeed distort this particular measure of illegitimacy. However, using micro-level data, it becomes possible to calculate the number of unmarried women who were at risk of having an illegitimate child within any given population and at any given time. By relating this information to the actual number of illegitimate births the illegitimacy rate can be calculated.

For the towns of Falkirk and Hawick between 1871-90 this information is presented in Table 6.6. It is immediately apparent from this Table that the illegitimate fertility rates for the two Scottish towns were practically identical, in contrast to the differential observed in the illegitimacy ratios presented in Table 6.4, although the same pattern of decline is still evident.

Table 6.6. Illegitimate Fertility Rates, Falkirk and Hawick, Ten Year Intervals 1871-90 (Number of illegitimate births per 1,000 unmarried women aged 15-45). 14

	1871-80	1881-90
Falkirk	30.0	23.6
Hawick	29.7	23.1

Source: Decennial Censuses; RG Quarterly Returns.

There are a number of explanations for the discrepancy in the two measures of illegitimacy. With regard to the ratios, the higher level of the ratio exhibited by Hawick may have been influenced by either a large number of illegitimate births or conversely by a small number of legitimate births or indeed possibly a combination of both factors. On the other hand, in relation to the illegitimate fertility rates, a relatively larger number of unmarried women in Hawick in the younger adult age groups could have been causing the similarity between the rates for the two towns. If we refer back to data already presented in the previous chapter, then we can explore this matter in greater detail.

The completed family size data for the four groups of workers, given in Tables 5.1 to 5.4 indicated that the ironworkers had, on average, one extra child compared with any of the other three groups; in this case, it is likely that overall legitimate fertility was operating at a higher level in Falkirk as compared with Hawick and this in turn would make illegitimate fertility (if it is measured by the illegitimacy ratio) appear lower in the iron town. Furthermore, imbalances in the sex ratios in both towns have been

observed and this has been identified as a potential influence on the proportions of women remaining unmarried at various ages. Therefore, the two towns may have played host to very different age distributions in relation to unmarried women. It is thus obvious that measuring the incidence of illegitimacy for comparative purposes presents considerable problems and a satisfactory explanation clearly involves a parallel examination of legitimate fertility, the sex ratio and the proportion of women at various ages at risk.

In summing up, we can say that the illegitimacy ratio indicated a disparity between Falkirk and Hawick, whereas the illegitimate fertility rate showed a similarity, although both indicators highlighted a decline occurring over time. It is suggested that higher legitimate fertility in the iron town may have been partly responsible for the differential in the ratios, while at the same time a larger proportion of young, unmarried women in Hawick may have removed this differential in the case of the illegitimate fertility rates. On the other hand, this rate was seen to fall by the period 1881-90, while conversely the proportion of young unmarried women had increased¹⁵ and therefore this structural argument loses some of its strength.

However, despite the conflicting evidence provided by the illegitimacy ratios and the illegitimate fertility rates, we are still left with a significant difference in the experience of illegitimacy among the four groups of workers, as demonstrated in Table 6.3. Let us then explore some of the potential causes already alluded to earlier.¹⁶

Causes of Different Illegitimacy Experience

Possibly the most fruitful line of enquiry here is an examination of any similarities and differences in the ability to enter marriage. If courtship and subsequent marriage were, for whatever reason, delayed and this was in some way associated with an increased likelihood of illegitimacy, then one might expect the age of marriage to be later in those groups where illegitimacy was highest and earlier where it was lowest. Referring to the age of marriage data in Chapter Five, we are reminded that the age at first marriage was slightly later in the case of textileworkers' wives.¹⁷

Taking the analysis a stage further, we can calculate separately the age of marriage for only those couples who experienced an illegitimate birth and it is apparent that the female ages of marriage are mostly slightly higher than the average age for each of their respective groups.

From the evidence presented in Table 6.7, it can be suggested that the later age of marriage of women bearing illegitimate children, may have resulted either from a delaying strategy on the part of individuals or from the untimely intervention of some barrier to marriage. Furthermore, as described in Chapter Three, wages in the Hawick textile trade were less than those paid to the ironworkers of Falkirk and as a consequence courting couples in the former town may have had to wait longer before their economic independence and survival was assured.

Table 6.7. Mean Age at Marriage, All Four Groups and Illegitimate Childbearers, 1860-71.

	Groups of Workers			
	Iron	Non-Iron	Text.	Non-Text
Females				
Complete Groups	20.4	20.6	21.0	21.0
Illegitimate Childbearers	22.6	21.0	21.4	20.8
Males				
Complete Groups	22.7	22.7	21.9	23.3
Illegitimate Childbearers	22.6	23.0	21.9	21.0

Source: Census/Birth Register Linkage.

It is also possible that the nature and extent of control over courtship behaviour may have differed between the two Scottish towns or between the two major industrial groups in such a manner as to either increase or decrease the likelihood of marriage. Where 'traditional' forms of courtship behaviour were not accompanied by parallel familial control mechanisms, as in the urban setting, Scott and Tilly have suggested that if an unmarried woman became pregnant then a wedding might not necessarily have followed, since marriage was more difficult to enforce.¹⁸ However, according to this line of argument, illegitimacy should have been as common in Falkirk, if not more so, since if anything it was probably the more 'urban' of the two towns.

With regard to the same issue, Smout, in his explanation for the

very high illegitimacy levels observed in Banff, focuses on the absence of familial control operating within the 'chaumer' or farm-kitchen system of labour in agriculture.¹⁹ The lack of local accommodation for married farm servants near to the farms meant that all the workers slept in rooms or outhouses attached to the farm and ate their meals together in the farm kitchen. The lack of familial control and the opportunities for mixing between the sexes thus encouraged relationships to develop and yet the shortage of accommodation for married couples acted as a block to marriage. In this way a tradition of premarital sexual activity and illegitimacy developed in this particular area.

The important point to note then is that a lack of familial control cannot be directly and uniquely associated with increased urbanisation in any simple way. Indeed, in nineteenth century Scotland, like many areas of England and Wales, it was the cities that had the lower levels of illegitimacy as compared with the rural districts.²⁰

In terms then of the different proportions of families in each of the groups who experienced an illegitimate birth, it is extremely difficult to reach any firm explanation. For example, it may have been that marriage was slightly more difficult to enter in Hawick than in Falkirk and moreover that it was easiest for ironworkers and most difficult for textileworkers. Alternatively, patterns of courtship and familial control may have differed between the two towns, although if this had indeed been the case, then one would have expected more of a locality-specific effect in Table 6.3.

It is interesting finally to note that within the textile group three families experienced more than one illegitimate birth, two families having illegitimate children twice and one family having three children before they finally married. Having to delay marriage and then giving birth whilst still unmarried is a feasible explanation for a first illegitimate maternity but less so on the second or third occasion.

Therefore in Hawick in the 1860s might it have been more acceptable in theory and more common in practice for couples to have illegitimate children at least before they finally married? Any attempt to assess the social acceptability of illegitimacy in either town at this period is, of course problematic, although it was said of the county of Roxburgh in 1867 that 'the stain of bastardy is little felt and forms no serious impediment to success in life'.²¹ However, it may also be that illegitimacy was more common where an unmarried mother had the ability, if necessary, to support the baby on her own²² and in which case the opportunities for female employment in the textile town may have contributed to the observed higher incidence in the textile group.

Conclusion

This chapter has added to our stock of knowledge with regard to the reproductive and courtship behaviour of the four groups of workers. On the other hand, little has been uncovered which would greatly assist an explanation of the overall fertility differential of almost one child between the ironworkers and the textileworkers. However, from the evidence we have suggested that the patterns of

illegitimacy occurring within the two Scottish towns may indeed possess internal variations and furthermore that these may have been occupationally determined. It is therefore worth stressing once again that only by means of investigations at a micro-level can such potential differences and similarities be revealed.

Chapter Seven

FERTILITY PATTERNS WITHIN THE REPRODUCTIVE SPAN

Introduction

In this chapter many of the issues first discussed in Chapter Five will be returned to, expanded upon and developed to a point where it should be possible to lay a foundation for potential explanations for the similarities and differences in the patterns of nuptiality and fertility exhibited by the ironworkers and textileworkers. The discussions in Chapter Five centred round the measurement and comparison of such factors as the age at first marriage, the age of the mother at the birth of the last child and the length of the last birth interval. Certain criticisms were then introduced, suggesting that these indicators were static, in that they only represented one-point-in-time snapshots of elements within the overall fertility regime. To an extent then they were used to map a perimeter around reproductive behaviour by highlighting the exact timing of the start and finish of the years of childbearing occurring within marriage. Subsequently in Chapter Six, there was a discussion of the ways in which this boundary fence could be extended outwith and prior to marriage.

Having therefore flagged the beginnings and the ends of the periods of exposure to conception, it now becomes increasingly important to investigate the internal workings of the different fertility patterns. In order to facilitate this sort of analysis, the age of the mother at the birth of each child is required and therefore it

falls to micro-level studies to provide such evidence, since work employing aggregate data can only put forward estimates regarding this matter.¹ The age of the mother at each birth was not required to be entered on the birth registration schedule of any child prior to the Population (Statistics) Act 1938 and consequently this information can only be made available for the nineteenth century through a process of linking census material with birth registers.

Age-Specific Fertility

The present research design permits the calculation of the number of women who gave birth in any one year and moreover the data can be broken down into age categories. If this number is taken as a proportion of the total women in any particular age category who were eligible to give birth, with the result being multiplied by 1,000, then this provides us with the age-specific fertility rate for women of that age. It is usual to calculate the data in five or ten year age categories. Quite simply then, an age-specific marital fertility rate is arrived at by setting the number of births occurring to married women, in a particular age category and during a particular time period, against the total number of married women who were 'at risk' or eligible to have a child according to the same criteria. It is worth noting that, due to the process of calculation, the age-specific fertility rates used in this chapter are not affected by the potential bias towards those married at a young age inherent in the research design.

In Table 7.1 the overall age-specific marital fertility rates are

presented for the ironworkers and the textileworkers for the period 1860-89. Most obvious is the recognised general pattern of a steady shortfall in fertility occurring as age increases; however, there are certain interesting internal variations.

Table 7.1. Age-Specific Marital Fertility Rates and Total Marital Fertility Ratios, Iron and Textile Groups, Completed Reproduction Only, 1860-89.

	N	15-19	20-24	25-29	30-34	35-39	40-44	T.M.F.R.
Iron	46	517	482	423	413	348	139	9.02
Text.	33	375	480	439	364	285	162	8.6

Source: Census/Birth Register Linkage.

Note: T.M.F.R. calculated for age 20-44. The raw data for the age-specific marital fertility rates is set aside in Appendix D.

Both groups of workers have similar high fertility rates in the age groups 20-24 and 25-29. Thereafter, although a general pattern of decline is evident, this is more acute in the case of the textileworkers. In the age groups 30-34 and 35-39, the ironworkers demonstrate a considerably higher level of fertility. The figures for the 40-44 age group go the other way, but fertility rates in this age group have a tendency to be somewhat erratic and too much significance should not be attributed to this fact. Moreover, this tends to be in keeping with the later age of mother at last birth which was demonstrated for married women in the textile group in Table 5.10.

The figures in Table 7.1 were based only on the reproductive careers of those married women who completed their childbearing years while still under surveillance through the demographic records and as a result, the number of cases remains small. It is therefore advantageous to repeat the calculations including those whose reproduction was incomplete in an attempt to verify the patterns of childbearing outlined above.

A woman was regarded as eligible for inclusion in the at risk numbers up to and including the last year of observation either at a census or in a birth register. The last point of contact was usually a birth schedule. In this way then, the fertility rates may have been systematically over-estimated since potential childbearers whose existence could no longer be traced had to be removed from the pool of eligible women, despite the possibility that they might have continued to reside in either town, remain married and yet have no more children for a further number of unregistered years. However, this potential exaggeration of the age-specific marital fertility rate would apply equally to both the ironworkers and the textileworkers and consequently any comparisons between these two groups remain legitimate.

Table 7.2. Age-Specific Marital Fertility Rates and Total Marital Fertility Ratios, Iron and Textile Groups, Completed and Uncompleted Reproduction, 1860-89.

	N	15-19	20-24	25-29	30-34	35-39	40-44	T.M.F.R.
Iron	105	479	466	421	395	334	155	8.86
Text	74	347	466	414	362	292	168	8.51

Source: Census/Birth Register Linkage.

Note: T.M.F.R. calculated for age 20-44.

The figures in Table 7.2 (see also Figure 1 in Appendix C) confirm the hypothesis that the textileworkers' wives were experiencing fewer births by the 30-34 age group than women married to ironworkers. It is interesting to note in Tables 7.1 and 7.2 that the total marital fertility ratio, that is the total fertility a woman would experience if she followed exactly the age-specific marital fertility schedule, indicates a differential between the iron and textile workers. If the fertility rate in the 20-24 age group is taken as representing a base line of fertility, say of 100, then perhaps it will be easier to assess the exact level of decline across the age groups for both groups of workers.

Table 7.3. Relations of Age-Specific Marital Fertility Rates to the Rate at Age 20-24, Iron and Textile Group, 1860-89.

	N	20-24	25-29	30-34	35-39	40-44
Iron	105	100	90	85	72	33
Text.	74	100	89	78	63	36

Source: Census/Birth Register Linkage.

The age-specific marital fertility data, presented in Table 7.3, indicate that in spite of the expected decline in fecundity which occurs as a woman's age increases, there are also factors operating to create a differential in this decline. In the 30-34 age group there is a difference in the fertility exhibited by the two groups, measured here by seven percentage points and this has increased to nine percentage points in the 35-39 age group. In other words, the ironworkers maintain a higher age-specific marital fertility rate for a larger part of the reproductive span than is the case in the textile group.

A further check which may be made on the differential age pattern of marital fertility lies in comparing the proportion of the total marital fertility ratio which is provided by women who are over thirty years of age. This data is presented in Table 7.4.

Table 7.4. Percentage of Total Marital Fertility Ratio contributed after Age 30, Iron and Textile Groups.

Completed Reproduction	Proportion of T.M.F.R. after 30
Iron	49.9
Text.	46.8
Comp. & Uncomp. Reproduction	
Iron	49.9
Text.	48.3

Source: Tables 7.1 and 7.2.

In populations where 'natural' fertility is widespread the value remains close to 50 per cent, whereas if family limitation is

practised, then the value declines considerably. From the data in Table 7.4 it is apparent that while the ironworkers adhere to a format in keeping with 'natural' fertility, the textile group have taken up a position which may be indicative of a small amount of family limitation. This evidence therefore complements the analysis of the age-specific marital fertility data so far presented and demonstrates that perhaps the beginnings of a fertility differential may be observed in the case of the textileworkers even at the start of the general fertility decline.

No evidence has been found to support the possibility that the women of Hawick, and those married to textileworkers in particular, were any less fecund in their later years than women from elsewhere; indeed the data for the 40-44 age group might strengthen the opposite view. Furthermore, if variations in the ability to conceive were at the root of differentials in age-specific marital fertility rates, then the levels of fertility in the younger age groups would almost certainly have also been affected (for example if the differentials were due to a higher incidence of venereal disease or problems in childbirth). As this was not the case this line of argument may be discounted.

Instead, the evidence presented in Tables 7.1 to 7.4 lends some support to the hypothesis that married women whose husbands were employed in textiles and who lived in textile-dominated towns were beginning to make attempts to restrict the size of their families quite early in the second half of the nineteenth century. Furthermore, the mechanism adopted would appear to have taken the

form of limiting the number of births once a woman had reached her thirties and moreover this strategy was, in many instances, successful.

Cohort Analysis

Shifting emphasis slightly, the differences in the patterns of childbearing exhibited by the iron and textile groups, and especially those determined by age, may best be expressed by recourse to cohort analysis. In Table 7.5 (see also Figure 2 in Appendix C) the age-specific marital fertility rates for the age cohort 25-29 in the period 1870-74 are traced across the years of the complete reproductive span.² The overall pattern is once again consonant with the expected shortfall in fertility which occurs as the age of the woman increases. However, as before there are certain variations both in the speed with which this shortfall takes place and in its extent.

Table 7.5. Age-Specific Marital Fertility Rates, Iron and Textile Group, Age Cohort 25-29 in 1870-74 Traced Across the life Cycle, Completed Reproduction Only, 1860-89.

		1860-64	1865-69	1870-74	1875-79	1880-84	1885-89	
	N	15-19	20-24	25-29	30-34	35-39	40-44	T.M.F.R.
Iron	31	476	508	444	405	366	124	9.24
Text	20	333	469	430	350	260	150	8.30

Source: Census/Birth Register Linkage.

It is important to note that for this particular age cohort the textileworkers have a lower age-specific marital fertility rate than the ironworkers at every point in their reproductive careers, except at the very end. However, the most important aspect of Table 7.5 is that it refers to a single age cohort, identified and analysed within the overall context of the research design. In other words, it is a sub-set possessing considerable purity in terms of its analytical capacity. As such, the data from this cohort clearly indicates the different fertility experiences attributable to the iron and textile workers, especially in the 35-39 age group. Furthermore, the total marital fertility ratios in Table 7.5 demonstrate a significant fertility differential of 0.94 in favour of the ironworkers.

Therefore despite the element of doubt cast upon the validity of the fertility differential observed in Chapter Five, in light of the identification of a potential bias in the original research design, it has now been shown in a number of different ways that not only did this differential truly exist but that it was also of significant magnitude to warrant the hypothesis that in some way or other the textileworkers were limiting their completed family size.

Returning to the data in Table 7.5, if we use the age-specific marital fertility data for the age group 25-29 as the base figure of 100, in the same manner as the calculations for Table 7.3, then the difference in reproductive behaviour between the two groups of workers may become more apparent.

Table 7.6. Relation of Age-Specific Marital Fertility Rates to the Rate for Age Cohort 25-29 in 1870-74, Iron and Textile Groups, Completed Reproduction Only.

	N	25-29	30-34	35-39	40-44
Iron	31	100	91	82	28
Text.	20	100	82	61	35

Source: Census/Birth Register Linkage.

According to the data presented in Table 7.6 the shortfall in fertility is once again highest for the textileworkers and furthermore this process is seen to begin at an earlier age. By their early thirties the textileworkers' wives have reduced their fertility by 18 per cent from their 25-29 age group level and this is double the reduction for the iron group. This decrease on the part of the textileworkers has become 39 per cent by the time women are in their late thirties, as compared with a mere 18 per cent in the case of the ironworkers. Therefore, the evidence again supports the hypothesis that family limitation practices were being utilised to a greater extent and at an earlier age by those women whose husbands worked in textiles, in contrast with those who had married an ironworker.

However, were there any factors inherent in the data which might be affecting these fertility rates? For instance, a delayed marriage occurring when the woman was in her late twenties, could undoubtedly lead to higher levels of fertility being experienced during her early thirties, than would otherwise have been the case had she married five or six years earlier. If later marriage was more of a rule for

one group of workers as opposed to another, then this in itself might affect the age-specific fertility data.

It has already been shown in Chapter Five that the textileworkers' wives married slightly later than their counterparts in the iron group.³ However, more important is the fact that very few marriages took place after the age of twenty five in either group.⁴ Moreover, it is the textileworkers who marry later and who might therefore have logically been expected to exhibit higher age-specific fertility in their early thirties. The slightly later age at marriage common to the women of the textile group may therefore have partly caused the higher age-specific marital fertility rate in the textileworkers' 25-29 age group as shown in Table 7.1 although this pattern was not repeated in either Tables 7.2 or 7.5.⁵

To sum up, it would seem that thirty years of age marks a watershed in the reproductive careers of textileworkers' wives. If their twenties is a time for concerted childbearing, then their thirties represents the point at which the brakes begin to be applied and fertility becomes limited. To say that fertility begins to be controlled might however be to misinterpret the rationale underlying earlier reproductive behaviour since high rates of fertility may in fact be deliberate and therefore controlled, albeit in a different manner. We shall return to this discussion in the final chapter.

Coale and Trussell's Model of Fertility

The existence or otherwise of family limitation within a population has recently been approached through comparing observed fertility

with a standardised model representing natural fertility. This model has been developed by Coale and Trussell,⁶ on the basis of sets of age-specific marital fertility figures provided by Henry.⁷ The model presupposes firstly that marital fertility, under conditions of natural fertility, follows a particular pattern across the life-course as determined by a couple's physiological state and secondly, that if family limitation does exist, then the observed marital fertility will increasingly differ from the natural regime at each age of the wife. The model has been condensed into the following equation:

$$r(a) = M(na)e^{m(va)} \quad 8 \quad \text{OR}$$

$$m = \log_n [r(a)/(M.n(a))] / v(a)$$

$$M = r(a)/n(a) \text{ at age } 20-24$$

In Table 7.8 the m-values are presented for the iron and textile workers with completed reproduction as well as for those with completed and uncompleted reproduction. According to Coale and Trussell, m is an index of fertility control where a value close to 0.0 represents natural fertility and a value nearer to 1.0 is indicative of a substantial amount of control. Family limitation is usually considered present if an m-value greater than 0.24 or 0.2 is found.⁹

The m-values provided in Table 7.8 do not meet this requirement for either group of industrial workers, despite the fact that two distinct patterns emerge (and in particular that m-values for the textile group tend more often to be greater than those for the ironworkers). The mean m-value for textileworkers in the completed

and uncompleted reproduction group is 0.112 as compared with a similar m-value of 0.047 for the ironworkers. Superficially, therefore, Coale and Trussell's model of marital fertility does not appear to lend weight to the argument which portrays the textileworkers as engaging in family limitation

Table 7.8. Value of m for Age Groups 25-29 to 40-44 for Iron and Textile Workers, Families of Completed Reproduction and Complete and Uncomplete Reproduction.

	Complete Reproduction		Complete and Uncomplete Reproduction	
	Iron	Text.	Iron	Text.
25-29	0.235	0.085	0.130	0.190
30-34	0.003	0.183	0.019	0.148
35-39	-0.030	0.158	-0.023	0.106
40-44	0.162	0.051	0.062	0.005
Mean	0.092	0.119	0.047	0.112

Source: Tables 7.1 and 7.2

Note: The M values were as follows: Completed Reproduction - Iron = 1.048 (482/460); Text = 1.043 (480/460); Completed and Uncompleted Reproduction - Iron = 1.013 (466/460) Text = 1.013 (466/460)

However, it has been pointed out that certain differences in child spacing behaviour, which may also accompany the move towards family limitation, may affect the age-related pattern of deviation from a natural fertility schedule.¹⁰ In particular, if a specific strategy of spacing births is being enacted, then a higher than expected marital fertility rate may be in evidence in the older age groups compared with a situation where stopping behaviour alone is

being practiced. Where this is the case, Coale and Trussell's $v(a)$ -values are likely to be too high since they are not specifically calculated to take birth spacing into account. Coale has himself admitted that m -values could be improved by the inclusion of an internal $v(a)$ function oriented specifically for different regions and different populations.¹¹

In light of this discussion, it might therefore be wise to exercise a degree of caution when interpreting the results presented in Table 7.8. Coale and Trussell have stated that "empirically calculated sequences of m -values by age are not uniform in all instances when applied to actual marital fertility schedules, although clear differences in the levels for different populations are typically quite evident".¹² The figures for the iron and textileworkers would seem to be a case in point. The m -values in Table 7.8 (particularly if the families with uncompleted reproduction are included) clearly show that the ironworkers' marital fertility schedule closely follows a 'natural' fertility pattern. It is further interesting to note that in the age group 35-39 the m -values for this group are both negative, thus indicating that fertility has declined more slowly with age than in the standard schedule. On the other hand, the m -values for the textileworkers, taken across the age groups, are more in keeping with the beginnings of a move away from 'natural' fertility towards some form of reproductive control.¹³ This is clearly consistent with the overall suggestion of this thesis to date that, in the textileworkers of Hawick we may indeed be observing the very first stages of a fertility decline or a weak predecline fertility limiting strategy.

Shadow Effect

A second line of enquiry running through the present study centres around the hypothesis that certain aspects of the marital and reproductive behaviour exhibited by those engaged in the dominant industry or form of employment, may also be found with regard to families resident in the same geographic area but in which the husband was employed in other pursuits. If workers not engaged in the predominant form of work were found to follow quite closely the patterns of marital and reproductive behaviour associated with those who were employed in this manner, for whatever reason, then historical demographers might not have to be so careful in their avoidance of the ecological fallacy. Let us return to the age-specific fertility data for the two Scottish towns and try and tease out whether any shadow effect is present.

Table 7.9. Age-Specific Marital Fertility Rates, Four Groups, Completed and Uncompleted Reproduction, 1860-89.

	N	15-19	20-24	25-29	30-34	35-39	40-44
Iron	105	479	466	421	395	334	155
N-Iron	56	412	422	426	402	324	108
Text	74	347	466	414	362	292	168
N-Text	73	353	459	402	398	315	164

Source: Census/Birth Register Linkage.

To concentrate solely on the textile town of Hawick for a moment, both Tables 7.9 and 7.10 indicate that compared with non-textileworkers, the textileworkers began to exhibit a lower level of fertility in the age group 30-34 and this trend then tends to be

followed by their control group in the 35-39 age group. Interestingly, both groups of workers from Hawick exhibit a higher level of fertility in the 40-44 age group as compared with their two counterparts in Falkirk.

Table 7.10. Relation of Age-Specific Marital Fertility Rates to the Rate at Age 20-24, Four Groups, 1860-89.

	N	20-24	25-29	30-34	35-39	40-44
Iron	105	100	90	85	72	33
N-Iron	56	100	101	95	77	26
Text	74	100	89	78	63	36
N-Text	73	100	88	87	69	36

Source: Census/Birth Register Linkage

This last observation is again in keeping with the later age of the mother at the birth of her last child which was demonstrated for married women in Hawick in Tables 5.21 and 5.22. Furthermore, this ties in with Wrigley's hypothesis concerning certain of the side-effects of family limitation, whereby attempts at fertility regulation may sometimes break down and cause a birth to occur late in a woman's life.¹⁴

Moving now to the iron dominated town of Falkirk, there would seem to be even less of a similarity between the fertility behaviour of the two groups of workers. The comparatively low age specific fertility rate for the non-iron group in the 20-24 age group (seen in Table 7.9) is somewhat surprising, although this particular level is maintained almost up until the 30-34 age group.

In Falkirk, women marrying non-ironworkers tended to do so slightly later than those marrying ironworkers; however, this differential was not nearly large enough to constitute an explanatory device for the observed reproductive behaviour. Had there been a more significant difference in the ages at marriage, it could have been suggested that a later marriage, occurring within a high fertility locality, might have entailed continual childbearing for say the first ten years in an attempt to re-align overall fertility with those others who entered marriage earlier.

To sum up, there is little hard evidence within the age-specific fertility data which would testify to the existence of a shadow effect operating within either of the two Scottish towns. The evidence in Table 7.10, especially in the 30-34 and 35-39 age groups, suggests that the textileworkers were the only group who could reasonably be accredited with practicing family limitation. Therefore, in the light of this data at least, different groups of workers within the same geographic locations would appear not to act in similar ways with regard to childbearing and consequently ecologically fallacious arguments must still be carefully avoided.

Declining Fertility Over Time

Let us now shift the emphasis and consider the question of declining fertility taking place over time. This whole issue will be discussed in greater detail in the next chapter but for the moment, the age-specific marital fertility data from the two Scottish towns provides a limited opportunity for the investigation of longitudinal change.

Table 7.11. Age-Specific Marital Fertility Rates, Iron and Textile Group, Completed and Uncompleted Reproduction, 1860-69, 1870-79 and 1880-89.

Iron	1860-69	1870-79	1880-89
15 19	479	-	-
20-24	492	414	-
25-29	415	423	-
30-34	-	416	316
35 39	-	367	322
40-44	-	-	155

Text	1860-69	1870-79	1880-89
15-19	347	-	-
20 24	490	436	-
25-29	449	405	-
30 34	-	372	329
35-39	-	328	279
40-44	-	-	168

Source: Census/Birth Register Linkage.

The nature of the data presented in Table 7.11 makes it difficult to identify any certain patterns of change occurring over time in the reproductive behaviour of either group of workers. For example, the number of cases in some instances is quite small and this may cause random fluctuations in the data.¹⁵ On the other hand, the possible emergence of certain trends may be detectable and therefore worthy of a degree of attention.

Once again the shortfall in fertility occurring with age is observable for all three time periods but importantly this is most apparent in the case of textileworkers. Furthermore, the levels of fertility exhibited in 1870-79 in the textile group's 30-34 and 35-

39 age groups are considerably reduced in 1880-89. Interestingly, the same phenomenon occurs in the iron group, although the 30-34 age group's figure in 1880-89 may be the result of small numbers randomly influencing the fertility rate. However, in the 35-39 age group both the ironworkers and the textileworkers are seen to decrease their fertility rate by 1880-89 by almost equivalent proportions.

The evidence, despite its limitations of coverage, suggests that, by the period 1880-89, those women who were in their late thirties, in both the iron and textile groups, were having fewer births at this stage in their reproductive careers than their predecessors had experienced ten years before. This does not of necessity mean that the completed family size had been reduced, only that fertility was less in the later years of childbearing. Clearly this amount of evidence can only permit the most tentative conclusions but it does seem possible that by the 1880s a decline in fertility could have been taking place both in the case of ironworkers in Falkirk and textileworkers in Hawick. However, before attempting to develop this argument in the next chapter, let us look briefly at the longitudinal age-specific fertility data for the two control groups from each town.

Table 7.12. Age-Specific Marital Fertility Rates, Four Groups, Completed and Uncompleted Reproduction, 1860-69, 1870-79 and 1880-89.

Age Groups	Iron			Non-Iron		
	1860-69	1870-79	1880-89	1860-69	1870-79	1880-89
15-19	479	-	-	412	-	-
20-24	492	414	-	411	441	-
25-29	415	423	-	435	424	-
30-34	-	416	316	-	401	404
35-39	-	367	322	-	481	284
40-44	-	-	155	-	-	108

Age Groups	Text			Non-Text		
	1860-69	1870-79	1880-89	1860-69	1870-79	1880-89
15-19	347	-	-	353	-	-
20-24	490	436	-	449	480	-
25-29	449	405	-	427	395	-
30-34	-	372	329	-	399	394
35-39	-	328	279	-	302	320
40-44	-	-	168	-	-	164

Source: Census/Birth Register Linkage.

The data presented in Table 7.12 show that those not engaged in either predominant industry did not unambiguously follow the same pattern of reduction in fertility rates across time periods. For instance, this is apparent from the 30-34 and 35-39 age group information. In general, no clear evidence of any shadow effect is discernible.

Conclusions

From the evidence provided in this chapter, using age-specific marital fertility analysis, we can now move a step nearer an

adequate explanation for the fertility differential of almost one child which was observed between the ironworkers and the textileworkers in Chapter Five. Through the process of investigating each stage in the reproductive careers of women married to those employed in both of the predominant industries, certain important differences have been uncovered.

The age-specific marital fertility rates indicate that the textile group had a considerably lower level of childbearing experience than the ironworkers by the time a woman had entered her late thirties. Moreover, this process of differentiation appears to have begun whilst the women were still in their early thirties. The age of thirty therefore seemed to have represented a watershed in the reproductive career of a textileworker's wife, in that prior to this her fertility was comparatively high and then, as she progressed through her thirties, a steady reduction in the fertility rate occurred.

A decline of this sort would have been expected as a woman's age increased but since the decrease observed was comparatively much greater than that achieved by the iron group, we are led to the conclusion that something other than a 'natural' intervention was causing this phenomenon. The use of a cohort analysis has made the distinction between the childbearing patterns of the two groups even more clear, through emphasising the gap in the fertility rates evident in the 35-39 age group.

The application of Coale and Trussell's fertility model again demonstrated the distinctive nature of the two groups' reproductive

behaviour despite the fact that the m -values demonstrated the need for caution when associating the textileworkers with the practice of family limitation. There was considerable evidence, however, throughout the chapter that the textile group had lower levels of fertility than the ironworkers in the later stages of their reproductive careers and that this was a major factor in determining their smaller completed family size. Furthermore, much of the evidence would also tend to support a hypothesis that the textileworkers were experiencing lower levels of fertility towards the end of the childbearing period as a result of a deliberate strategy designed to regulate fertility and limit the number of births. On the other hand, the discussion of the m -values raises the question of a birth spacing strategy which may have been adopted by the textile group either in preference to a stopping procedure or more likely alongside attempts at family limitation.

On a slightly different tack, however, the evidence in favour of a shadow effect in either town is much less convincing. The suggestion may, however, be made that the non-textileworkers were possibly following the same pattern as those working in textiles by reducing their fertility in the later years of childbearing, although the decline was less dramatic and tended to occur later in a woman's life.

Finally, towards the end of this chapter data regarding changing patterns of reproductive behaviour over time have been introduced on a modest scale. These data, however, only permit speculation as to potential trends but do, for example, allow the suggestion that both

the iron and textile groups were reducing their fertility levels by the 1880s. In order to develop this area of enquiry further, a second data set has been constructed and the analysis and results are now presented in Chapter Eight.

Chapter Eight

EARLIER PATTERNS OF FERTILITY

Introduction

So far in this study our analysis has focused on the period 1860-90, with attempts being made to identify and understand possible differences in the patterns of marital and reproductive behaviour of the ironworkers and the textileworkers from the two Scottish towns. Towards the end of the last chapter, the discussion was broadened to allow a brief look at changing patterns of fertility over time; however, the results were rather unclear and the methods available were not entirely suitable. Rather than using marriage cohorts, the data in Tables 7.9 and 7.10 were based simply on the number of women falling into specific age groups in any particular year or number of years. However, any satisfactory enquiry into fertility over time can only really be facilitated by an investigation of age-specific marital fertility rates calculated for different groups of women at different time periods.

In this study we have shown that a fertility differential of almost one child existed between the iron and textile groups in the period 1860-90.¹ However, from this data alone it is impossible to gauge whether the observed levels of fertility represent longstanding differences between the groups under study or if they are in fact a reflection of the beginnings of a downturn in fertility. The starting point for the 'great fertility decline' in Britain, it is generally agreed,² was the decade beginning in 1870 and therefore in

order to cast some light on the position of the iron and textile groups within this proposed overall fertility decline, a further data set has been constructed, which is not only relevant to an earlier period but also to the particular setting of the two Scottish towns.

The 1855 Data Set

As already discussed in Chapter Two, it is problematic to gain access to statistical information regarding fertility prior to the introduction of statutory civil registration procedures in Scotland in 1855. Old parish registers (OPR's) might have been used in an attempt at family reconstitution but their continuity and reliability is in many instances very poor.³ It therefore fell to the unique array of demographic data concealed within the 1855 civil registration schedules, and in particular the birth registers to act as a source for earlier fertility information.

All three sets of civil registration documents for the initial year of 1855, that is births, marriages and deaths, include a host of demographically valuable pieces of information and it is regrettable that this remained the only year for which so much material was required and reported. Had this particular exercise been continued, the detailed study of Scotland's historical demography would have been made considerably simpler and it would also have provided one of the richest accounts of past population patterns in Western Europe.

The 1855 data set for the four groups of workers from the two

Scottish towns was constructed in a manner born more from expediency rather than as a reflection of the theoretically ideal sample for the purpose in hand. The particular method of sampling used was, indeed, the only available means by which a distinct set of comparable data could be assembled. Consequently, certain problems arise since the criteria for inclusion in this data set were, firstly that a birth had to occur in 1855 and secondly, that the mother was aged thirty five years or over.⁴

This then is a non-representative sample of the population, since higher fertility women will be proportionately more likely to appear within this design. In turn, this means that comparisons between the two data sets may be less than completely valid. However, if we carefully investigate the exact nature of the 1855 data as we proceed, and further consider the time period to which it refers, then its practical usefulness will become apparent and doubts as to the validity of certain comparisons with the 1871 data will hopefully be removed, or at least tempered.

Completed Family Size

The information included in this chapter, as collated from the 1855 birth registers, refers to a period beginning around 1835 and continuing until the late 1850s. The marriage material is thus relevant, mainly for the 1830s and early 1840s, the overall childbearing data is located within the period 1835-60 and the figures regarding patterns of fertility towards the end of the reproductive span pertain to the mid- and late - 1850s. As a result of the selection method, the number of women whose

reproduction can be claimed to be complete, with any degree of certainty is rather small and consequently, the following analysis will concentrate on married women who were known to be aged forty or over in the period 1855-65.

The data in Table 8.1 show the mean and median number of births experienced by family units in the iron and textile groups. Both the mean and median figures demonstrate that the ironworkers have a larger completed family size than the textileworkers, with an absolute difference of 0.8 and 0.9 of a child respectively

Table 8.1. Number of Births Per Family, Married Women Aged 40 or Over, 1855 Data Set.

	N	Mean	Median
Iron	37	9.5	8.9
Text.	18	8.7	8.0

Source: 1855 Birth Registers, Falkirk and Hawick.

If in Table 8.2 we compare the 1855 data with the completed family size material for the 1871 data set, already presented in Chapter Five, then the most obvious conclusion is that a similar differential is observable in both cases. That is, the ironworkers' wives consistently experienced a larger number of births than their counterparts in the textile group and this therefore adds further weight to the hypothesis that certain occupationally-specific characteristics were operating to encourage women married to textileworkers to give birth less often. This finding is potentially highly significant since it superficially

suggests that the lower fertility of textileworkers observed in the 1871 data set is of longstanding rather than being an occupationally-specific first stage in the fertility decline.

Table 8.2. Number of Births Per Family, Married Women Aged 40 or Over, 1855 and 1871 Data Sets.

	1855 Data Set			1871 Data Set			
	N	Mean	Median	N	Mean	Rewt. Mean	Median
Iron	37	9.5	8.9	77	8.9	8.7	8.7
Text.	18	8.7	8.0	47	8.0	7.8	7.8

Source: 1855 Birth Registers: Falkirk & Hawick;
Census/Birth Register Linkage.

With regard to the comparability of the two data sets, the evidence contained within Table 8.2 provides a degree of internal validity for the research design. Firstly, whereas the distortion in the 1855 data has an equal probability of occurring in both the iron and the textile groups, we can observe that a differential in completed family size exists and moreover that it is consistent with that which appears in the 1871 data. Had this same differential not appeared or had it been inverse, then the comparability of the two data sets would have been immediately questionable.

Secondly, the ironworkers were a high fertility group and therefore the extent of the skew towards high fertility produced by the selection method is likely to be less than it would be for the population as a whole; conversely, the textileworkers have been observed elsewhere as a low fertility group and as a result, high

fertility textileworkers' wives may in fact be over-represented in the textile group. Under these circumstances, the 'true' differential is unlikely to have been less than the one shown in Table 8.2.

Thirdly, if the 1855 research design had referred to a period after 1880 when fertility in general was declining and modern reproductive patterns were developing, then women giving birth after the age of thirty five would definitely be regarded as high performers. However, in 1855 the levels of fertility were on the whole much higher and therefore it was not so uncommon for thirty five year old women to be giving birth. In other words, the particular period to which the 1855 data refer helps to reduce any distortion of the data. In general then, given also the skew which exists in the 1871 data, a degree of caution should clearly be exercised when comparing the material from the two data sets; nevertheless, the arguments developed above suggest that the 1855 data may be more representative than the selection method would initially lead us to believe.

Returning to Table 8.2, it is interesting to note that the figures indicate a decline in the completed family size observable between the two time periods. The mean figures, for example, indicate a reduction of over half a child between the 1855 and the 1871 data sets, for both the ironworkers and the textileworkers, although the median figures do not indicate quite such a dramatic decline.⁵ On balance, it therefore seems feasible that a degree of fertility decline may have taken place in the case of both the iron and textileworkers between the periods covered by the two sets of data.

The observed decline in fertility in the iron and textile groups, occurring as it did between the periods 1835-60 and 1860-90, is interesting because whilst it is entirely in keeping with the generally accepted timing of the overall reduction in completed family size, it is not in line with certain of the proposed mechanisms for the decline. For example, ironworkers are not usually considered to have been in the vanguard of this fertility revolution. Rather the middle classes and certain sections of the working class, most notably craftsmen and those workers in textiles, have been cast in the role of opinion-leaders and seen as responsible for the formation of new patterns of behaviour.

Therefore, the data in Table 8.2 would seem to permit the speculation that the fertility decline in Scotland may have been quicker to spread to certain groups within the working class who were previously regarded as maintaining high levels of fertility, possibly because their altered reproductive behaviour was still capable of producing a comparatively large completed family size. In other words, those groups within the population who in the 1870s and 1880s were regarded as high fertility performers may in fact have actually been reducing their fertility from even higher original levels.

The information contained within Tables 8.1 and 8.2 thus provides the basis for the central investigation for this chapter, namely an examination of the observed fertility differential between the iron and textile groups apparent within the 1855 data set. However,

there will also be a secondary discussion focusing on the suggested decline in fertility occurring over time, as evidenced in the lower figure for the completed family size in the 1871 data set.

Age at Marriage

One of the first factors to be investigated in Chapter Five as a potential cause of the observed fertility differential was the age at first marriage. For example, it was recognised that a variation in the age of marriage, especially for women, could be a contributory factor in the birth differential, on the basis that for every year younger that a woman married, she could at the beginning of her reproductive career, have an extra 0.36 of a child.

First of all we shall concentrate on marital patterns occurring within the 1855 data set before continuing with a discussion of the comparability of the 1871 material. In Table 8.3 the age at first marriage figures for males and females marrying during the period 1835-55 are presented. Looked at as a whole, the distribution for the female age at marriage in both the iron and textile groups show a remarkable degree of similarity and thus contain little which might have helped to explain the disparity of almost one child as observed in Table 8.1.

The 1855 female age at marriage data provide a further degree of internal validity for the research design since those women who married in their early to mid-twenties will be more likely to still have been reproducing at thirty five years of age, than if they had

entered marriage two or three years earlier. In other words, the age of marriage attributed to the 1855 data lessens the possibility of distortion by regarding women giving birth at age thirty five as normative behaviour rather than that associated with high performers only. Therefore, the comparative completed family size data presented in Table 8.2 again receives support from the nature of certain other information included in the 1855 data set.

Table 8.3. Age at First Marriage, Iron and Textile Groups, 1835-55

Females	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	40	22.9	20.3	22.4	23.8	3.4
Text.	28	23.1	19.6	22.3	24.0	4.4
Males						
Iron	40	24.7	21.5	23.2	26.3	4.8
Text.	28	26.3	22.5	24.0	27.0	4.5

Source: 1855 Birth Registers; Falkirk and Hawick.

Interestingly, for the males the distribution in Table 8.3 is slightly less clear. Whereas the mean figures indicate a differential of almost two years, the medians demonstrate a reduction to a disparity of less than one year. In general, the distributions show that male textileworkers tended to marry slightly later than men in the iron group.

Turning to the question of comparability between the age of marriage information for the 1855 and 1871 data sets, it is obvious that

there are major problems. For example, there may be a potential bias in the former for recording later marriages and in the latter for selecting those with earlier marriages.

In the 1855 data there is the possibility that those women giving birth aged thirty five or over may not have been high fertility performers but rather average performers who had begun their reproduction slightly later through entering marriage later. In which case, it is possible that the selection method overstated later female marriage in 1855.

However, the most serious difficulty in relation to a comparison of the age of marriage in 1855 and 1871 is that, whereas the former distributions relate to the entire populations of iron and textileworkers, the latter refers to a particular sub-set, namely those marrying at the age of thirty or under in 1871. Nevertheless, since the age of marriage distributions for the 1871 data tend to indicate that marriage in the late twenties was relatively uncommon for either group, it may be reasonable to suggest that only a small proportion of iron and textile workers were, in this context, marrying after thirty years of age.

In light of this discussion, it is considered worthwhile to present, in Table 8.4, the mean and median age of marriage figures for both sets of data. However, as it remains possible that the two data sets may be skewed in different directions, extreme caution must be exercised and consequently only a limited analysis will be attempted.

Table 8.4. Age at First Marriage, Iron and Textile Groups, 1855 and 1871 Data Sets, Married Women Aged 40 or Over.

	1855 Data		1871 Data			
	Mean	Median	Mean	Rewt. Mean	Median	Rewt. Median
Females						
Iron	22.9	22.4	20.4	21.0	19.6	21.0
Text.	23.1	22.3	21.0	22.3	19.8	22.2
Males						
Iron	24.7	23.2	22.7		22.0	
Text.	26.3	24.0	21.9		22.4	

Source: 1855 Birth Registers: Falkirk and Hawick;
Census/Birth Register Linkage.

In the context of this rather complicated comparison, it would seem safest to utilise the reweighted figures for the 1871 data set, as this will minimise the skew in the age of marriage distribution as much as is possible. In accordance the median female age of marriage for ironworkers' wives is seen to have fallen by at least a year, in contrast with those married to textileworkers where a degree of stability is visible.

Turning to the male age of marriage, it is interesting to note that the mean figures indicate a substantial reduction in the 1871 data and this is most apparent in the textile group.⁶ The median data, on the other hand, show a reduction but not of a similar magnitude. It may therefore be reasonable to suggest that fewer male iron and textileworkers were marrying late by the time of the 1871 data.⁷

To conclude this tentative age of marriage comparison, it can only

really be suggested that for women the situation has probably remained stable, although in the case of men there is stronger evidence to suggest that in both groups marriage was entered earlier by those workers in the 1871 data set.

Returning to the main analysis, let us investigate further the observed fertility differential in the 1855 data set by examining the age of mother at last birth, the mean length of the last birth interval and finally certain age-specific marital fertility data. Although the more limited nature of the 1855 data precludes as comprehensive an analysis as that provided for the 1871 data set, certain valuable inroads may still be made.

Age of Mother at Last Birth

The mean and median ages of mothers at the birth of their last child are presented for the 1855 and 1871 data sets in Table 8.5. According to the 1855 figures, the ironworkers' wives were one year older than those in the textile group at the birth of their last child. This may then be a contributory factor in explaining the larger completed family size observed in the case of the iron group in Table 8.1.

Table 8.5. Age of Mother at Last Birth, 1855 and 1871 Data Sets.

	1855 Data			1871 Data		
	N	Mean	Median	N	Mean	Median
Iron	37	43.4	42.7	77	39.1	39.2
Text.	18	42.4	41.8	47	39.2	39.6

Source: 1855-60 Birth Registers, Falkirk & Hawick
Census/Birth Register Linkage.

Turning to a comparison of the two data sets in Table 8.5, it would appear that the wives of workers in both groups were between two and three years younger at their last maternity in the 1871 data. On the other hand, it could be argued that the selection method adopted for the 1855 data may be causing a degree of upward skew, most notably through the potential bias towards those marrying later. However, I do not feel that the observed differential between the two sets of data may be entirely explained by means of this possible bias. Therefore, it is suggested that the figures in Table 8.5, even allowing for the influence of skewing, may form part of an explanation for the proposed decline in fertility occurring between the two periods represented by the data sets.

However, as pointed out in Chapter Five, this particular measure of fertility patterns is best used in conjunction with certain other information, and in particular, the length of the interval between the penultimate and last births.

Last Birth Interval

Table 8.6 contains the mean figures for the length of the last birth interval for the iron and textile groups and for both data sets.⁸ If we firstly examine the data for 1855, then it can readily be seen that there is a disparity of almost five months between the experience of the ironworkers and that of the textile group. Therefore taken together, the age of mother at last birth material in Table 8.5 and the last birth interval information in Table 8.6 tend to support the hypothesis that the textileworkers were producing fewer children by means of stopping or attempting to stop

their reproduction towards the end of their potential childbearing period. In other words, the same hypothesis which found support within the 1871 data set, as outlined in Chapters Five and Seven, may also prove to be equally applicable in the case of the 1855 data.

Table 8.6. Mean Length of Last Birth Interval in Months, Iron and Textile Groups, 1855 and 1871 Data Sets.

	1855 Data		1871 Data	
	N	Mean	N	Mean
Iron	27	38.2	77	35.8
Text.	13	42.8	47	47.1

Source: 1855-60 Birth Registers: Falkirk and Hawick;
Census/Birth Register Linkage.

Turning now to a comparison between the two data sets, probably the most significant feature is the four month increase in the last birth interval's length exhibited by the textileworkers in 1871. The evidence in Table 8.6 therefore supports the suggestion that the textile group may already have had an extended last birth interval in the 1850s, possibly the result of deliberate attempts to forego any further children. Moreover, it seems not unlikely that they may have continued to operate this particular strategy and to have done so to greater effect, so that by the 1880s they had managed to further increase the last birth interval.

It is interesting to note that the ironworkers, in contrast, seem if anything to have shortened their last birth interval by the later

period by just over two months and yet (on the basis of the data in Table 8.2) they would still seem to have managed to reduce their overall completed family size. The evidence in Table 8.5 suggested that ironworkers' wives in the 1871 data set were giving birth to their last child at a younger age than their predecessors in 1855 and this may have been a contributory factor leading to the observed decline in completed family size. However, on the basis of the data in Tables 8.5 and 8.6, it would seem less likely that the ironworkers would have achieved their suggested fertility decline through a stopping strategy similar to that put forward in the case of the textile group.

However, since the format of the 1855 data does not allow the measurement of any other birth intervals except the last, the only alternative means of exploring the internal workings of the reproductive span in this earlier material lies in the limited calculation of an age-specific marital fertility rate.

Age-Specific Fertility

Due to the paucity of early demographic data for either of the towns, the only age-specific marital fertility rate which can be presented refers to the solitary year of 1855. Furthermore, the information necessary to facilitate the calculation of this particular rate had to be assembled in a different manner to those already provided in Chapter Seven.

Comprehensive birth data, broken down by the age of the mother, was readily available in the 1855 birth registration schedules and in an

attempt to put this material to good use, calculations were made concerning the number of married women alive in this particular year, sub-divided into five year age groups. Since this type of information was not available in any published tables, recourse had to be made to the original enumerators' books for the 1851 and 1861 decennial censuses for each of the two Scottish towns. An average figure for the number of married women in each age group in 1855 was arrived at using these two sources of data and this then formed a base from which the age-specific fertility rates could be calculated.⁹

Table 8.7. Age-Specific Marital Fertility Rates, Iron and Textile Groups, 1855 and 1871 Data Sets.

1855	N	15-19	20-24	25-29	30-34	35-39	40-44
Iron	-	818	549	437	420	390	188
Text.	-	643	412	457	456	256	158
1871							
Iron	105	479	466	421	395	334	155
Text.	74	347	466	414	362	292	168

Source: 1855-60 Birth Registers, Falkirk & Hawick;
Census/Birth Register Linkage.

Table 8.7 contains the 'best estimate' of age-specific fertility rates for the iron and textile groups in 1855 and for the period 1860-89. It should be pointed out that since the earlier rate was calculated for one year only, there may be certain figures which are more the result of random processes causing either very high or very low levels of fertility in a particular age group. For example,

this may explain the comparatively low figure for the textileworkers in the age group 20-24 and the relatively high rate in the 30-34 age group. Subsequently, this high figure in the textileworkers' 30-34 age group will in all probability be contributing to the rather low figure in the 35-39 age group. However, despite the acknowledged drawback of presenting age-specific fertility data for a single year, the information was considered important enough to justify its inclusion in this chapter.

In the 1871 data set the textile group consistently demonstrated a lower level of fertility across nearly every age group. The hypothesis has therefore already been put forward in Chapter Seven that the textileworkers were possibly attempting to control their fertility, mainly through a stopping procedure, and moreover, that in many instances this strategy appears to have been successful. In contrast, the 1855 data for this group as compared with the ironworkers, provides far less evidence to support such a hypothesis, although the figure for the textileworkers' 35-39 age group may perhaps be representative of a degree of early limitation.

Turning to the ironworkers, however, the pattern is slightly more clear. Although the fertility rates in the 1855 data are higher than those for the later period, the same overall pattern remains, indicating a steady shortfall in fertility as the woman's age increases. Therefore, the ironworkers in the earlier period probably achieved a larger completed family size than their counterparts in 1871 through having slightly higher levels of fertility at all ages across the reproductive span.

To sum up, the evidence from the 1855 data suggests that the textile group achieved a smaller completed family size by completing their reproduction earlier than the ironworkers and also through having a larger last birth interval. It is further likely, although the evidence is not available, that the textileworkers had lower fertility levels either at certain points within the reproductive span across the whole childbearing period, since this would most likely have been necessary in order to account for the fertility differential of almost one child, as observed in Table 8.1.

With regard to the suggested decline in overall fertility, observed between the two data sets, the inclusion of the age-specific fertility analysis indicated that higher levels of fertility were possibly achieved by the iron group at all ages in the earlier period, although the figures relating to textileworkers were less clear.

Shadow Effect

Once again let us turn our attention to the hypothesis concerning the influence that the behaviour of those employed in the predominant industry in each town may have exercised over those engaged in other work but within the same locality. We shall restrict the analysis and the presentation of data to the 1855 material only, since the shadow effect is only applicable within the confines of each data set.

Table 8.8. Number of Births Per Family, Four Groups, 1855 Data.

	N	Mean	Median
Iron	37	9.5	8.9
N-Iron	29	8.8	8.5
Text.	18	8.7	8.0
N-Text.	28	8.7	7.8

Source: 1855 Birth Registers; Falkirk and Hawick.

The data presented in Table 8.8 show the completed family size for all four groups of workers from the two Scottish towns. The mean figures tend to suggest that the iron group has a higher level of fertility than any of the other three groups, but the median data provides at least tentative evidence to suggest that the two groups from each town are most like each other. In other words, there is some possible support here for the shadow-effect hypothesis, since both the groups from the textile town have lower overall fertility, according to the median figures, than those in the iron town. It therefore seems worthwhile to investigate whether any similarity of practice is associated with the age at first marriage in either Scottish town.

Table 8.9. Age at First Marriage, Four Groups, 1835-1855.

Females	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	40	22.9	20.3	22.4	23.8	3.4
N-Iron	33	26.0	22.4	25.5	24.4	6.9
Text.	28	23.1	19.6	22.3	24.0	4.4
N-Text.	19	23.6	21.8	22.6	25.2	3.5
Males						
Iron	40	24.7	21.5	23.2	26.3	4.8
N-Iron	33	24.3	21.9	26.0	30.4	8.5
Text.	28	26.3	22.5	24.0	27.0	4.5
N-Text.	19	26.9	21.2	24.0	31.6	10.4

Source: 1855-60 Birth Registers; Falkirk and Hawick.

The age at first marriage data, given in Table 8.9, suggest at least the possibility of potential examples of the shadow effect in operation. For instance, the males in the textile town of Hawick, irrespective of their form of employment, tended to marry at a similar age with the same pattern evident for the females. The main difference only occurs at the upper end of the distributions, where male and female non-textileworkers tended to marry proportionately slightly later.

In the iron town, however, the same degree of similarity is not in evidence. Those not engaged in iron manufacture appear to have tended to marry distinctly later than both the ironworkers and their wives; if this effect is not the result of random fluctuations (and

this is unlikely, given the size of the difference) then this is probably indicative of the degree of economic independence associated with employment in the iron industry which permitted the establishment of a viable family unit at a relatively early age. In this case, at least, an occupationally-specific effect seems the most plausible explanation of the observed pattern in the data.

Turning now to the patterns of reproduction exhibited by the four groups of workers, we shall examine firstly the age of mother at last birth and secondly, the length of the last birth interval.

Table 8.10. Age of Mother at Last Birth, Four Groups, 1855 Data Set.

	N	Mean	Median
Iron	37	43.4	42.7
N-Iron	29	42.8	41.5
Text.	18	42.4	41.8
N-Text.	28	42.4	41.8

Source: 1855-60 Birth Registers; Falkirk and Hawick.

Table 8.11. Mean Length of Last Birth Interval in Months, Four Groups, 1855 Data Set.

	N	Mean
Iron	27	38.2
N-Iron	18	34.4
Text.	13	42.8
N-Text.	19	38.1

Source: 1855-60 Birth Registers; Falkirk and Hawick.

The data regarding the age of the mother at the birth of her last child, as shown in Table 8.10, indicate that an identical pattern existed for the two groups from the textile town. In the case of the iron-dominated town, the figures for the non-ironworkers are more akin to those in the textile setting, thus showing the iron group as having the oldest age of mother at last birth. This finding therefore may help to explain the comparatively large completed family size observed in Table 8.8 for the iron group.

Switching to the mean length of the last birth interval, as given in Table 8.11, we can see that the data is more difficult to interpret with no particular evidence existing for any shadow effect. If anything, this data suggest that on balance the textileworkers appear to be somewhat unusual, in terms of their patterns of childbearing towards the end of their reproductive careers, in that they exhibit a markedly longer mean last birth interval than the other groups of workers.¹⁰

In conclusion, a limited amount of evidence has been located within the 1855 data which seems to support a hypothesis based on the shadow effect, especially with regard to the textile town. The two groups from Hawick indicate a similarity of experience in relation to their completed family size, their age at first marriage for both males and females and the age at which mothers give birth to their last child. In the case of the iron town of Falkirk, however, there is a greater degree of internal variation with the two groups showing marked differences in behaviour. From this it seems reasonable to suggest that the ironworkers represented a high fertility group not only in comparison with those in textiles but

also in relation to other workers within the same locality.

Conclusion

This chapter has described and explored as many facets of the marital and fertility patterns of the four groups of workers as was possible given the limitations of the 1855 data set. Furthermore, it has been possible to indulge in certain comparative analyses between the 1855 and 1871 data sets. However, in view of the potential non-comparability of the selection methods adopted in the construction of each set of data, the various suggestions arising out of such an exercise must be treated as exploratory rather than definitive.

However, an examination of reproductive behaviour towards the end of childbearing in the 1855 data indicated that textileworkers' wives were older at last birth and also had longer last birth intervals than those in the iron group. Moreover, this pattern is similar to that observed in the 1871 data set, although not so well defined. Therefore, it seems feasible to suggest, tentatively at least, that certain occupationally-specific factors operating to encourage iron and textile workers to behave differently may have already been in existence in the 1850s. This potential argument will be explored further in the next, and final, chapter.

Chapter Nine

SUMMARY AND CONCLUSIONS

Introduction

In the preceding chapters I have presented nuptiality and fertility data for both the ironworkers and textileworkers together with their two control groups. I must now begin to draw the various threads together and subsequently seek to put forward plausible explanations for the observed patterns of behaviour. Firstly, however, I shall provide a brief summary of the main findings of the present thesis.

Summary of Findings

Lying at the heart of the thesis was the discovery for the 1871 data set of a fertility differential of almost one child between the particular iron and textile groups selected for study, whereby the former exhibited a mean completed family size of 8.9 children as compared with 8.0 children in the case of the latter group.¹ In an attempt to understand how this disparity was achieved the age at first marriage data was examined and it was suggested that a larger proportion of textileworkers' wives entered marriage slightly later than their counterparts in the iron group.² There was also evidence within the context of illegitimacy that marriage may have been delayed more in circumstances where the prospective husband was a textileworker.³

Shifting to reproductive behaviour, the analysis focused on the age

of the mother at the birth of her last child, the length of the last birth interval and finally the length of all birth intervals excluding the last. Whereas only a slight age differential was demonstrated by the first indicator, with the wives of textileworkers being marginally older,⁴ the second measure showed a considerable discrepancy between the behaviour of the two groups of workers, in that many more women married to textileworkers exhibited a much longer interval between the penultimate and last births.⁵ Finally, the analysis of all other births, except the last, indicated that the textile group had consistently longer birth intervals than the ironworkers.⁶

This evidence therefore suggests that the smaller completed family size observed for the textileworkers was probably achieved by a number of different factors, either acting singly, or more likely in some combination. Small differences were located in the age of marriage, the age of mother at last birth, and the average length of all birth intervals; a larger disparity was uncovered with regard to the length of the last birth interval. Furthermore, it was suggested that the evidence supported the hypothesis that the textileworkers were deliberately limiting the size of their families (though to a limited extent) by exercising some means of control over their fertility, especially towards the end of their reproductive careers. In particular, the relatively small differences in the patterns of marriage and childbearing between the iron and textile groups were seen as representing a rather early and tentative start for fertility control on the part of the textileworkers.

In order to investigate the processes of family formation in greater detail, the patterns of childbearing exhibited by the two groups of workers were analysed at various points throughout the reproductive span, by means of age-specific marital fertility rates.⁷ This data, together with an analysis of one particular marriage cohort,⁸ indicated that textileworkers' wives experienced far fewer births in the age group 35-39 and moreover that this process of differentiation had already begun in the 30-34 age group. The age of thirty was thus posited as a turning point in the reproductive career of textileworkers' wives.

The age-specific fertility data therefore adds substantial weight to the hypothesis regarding family limitation, since almost all the evidence points to the textileworkers achieving a smaller completed family size primarily through the experience of fewer births in the later stages of childbearing. Furthermore, since no evidence was found to indicate that women marrying textileworkers were any less fecund than those wives in the iron group, the likelihood of deliberate fertility control seems enhanced. The discussion of Coale and Trussell's *m*-values on the other hand introduced the possibility of birth spacing as co-existing with family limitation and this therefore added a further dimension to the analysis. Therefore, the sum of the evidence presented in Chapters Five, Six and Seven strongly suggests that those in the textile group were operating one or more strategies of marital and reproductive behaviour which can be seen as consciously designed first attempts to control fertility and ultimately to limit the size of the completed family.

Turning now to the material contained in Chapter Eight concerning an earlier time-period, certain similarities with the results just discussed were observed, most notably the fertility differential between the iron and the textile groups.⁹ Moreover, there was a small amount of evidence to suggest that similar family limitation strategies may have been in existence, albeit in an embryonic form, amongst the textileworkers at this earlier time.¹⁰

A subsidiary finding arising from an analysis of the earlier data was the suggested decline in fertility which took place between the 1855 and 1871 data sets.¹¹ Certain doubts were raised as to the comparability of the two data sets in light of the particular sampling method used for 1855. Moreover, despite the provision of several strong arguments in favour of the validity of the earlier data, a degree of caution must still be advised. In my opinion, there is little doubt, however, that the level of overall fertility for both groups of workers was higher in 1855, although the particular figures presented may perhaps be slightly inflated due to the research design.

Finally, attention has been paid throughout the thesis to the possible existence of a shadow effect, whereby those workers not directly involved in the predominant industry in either town may have nevertheless exhibited similar marriage and childbearing patterns to those couples who were employed in the iron and textile industries. The evidence would seem to suggest that where a shadow effect does appear to exist, it is more likely to occur in the textile town of Hawick.

The completed family size data indicated that a larger proportion of the textileworkers and the non-textileworkers had fewer births than both the groups from the iron town.¹² In general, the distributions for the two groups from Hawick were more similar than those pertaining to Falkirk. Even more apparent was the similarity in the female age of marriage, where the figures for the iron and the textile groups were approximately reflected by their respective control groups.¹³ The same did not apply, however, to the male age of marriage data. One further strong association occurred in the length of the last birth interval material, where the two groups from each of the towns followed similar patterns, especially with regard to the upper end of the distribution.¹⁴

The illegitimacy data on the other hand, indicated no correspondence at all between the behaviour of the two groups from each of the Scottish towns.¹⁵ In a similar vein, little evidence was found to support the shadow effect hypothesis within the age-specific fertility data.¹⁶

With regard to the earlier data discussed in Chapter Eight, there was some evidence to support an hypothesis based on the shadow effect. Once again there was a similarity in the completed family size data for the textileworkers and the non-textileworkers, although this correspondence was less apparent in relation to the two groups in the iron town.¹⁷ The ages at marriage for both males and females in the textile town were quite similar, although slightly more of the non-textileworkers married a little later. Conversely in Falkirk, those not involved in the iron industry married on average three years later than the ironworkers,

indicating a marked discrepancy in behaviour.¹⁸ Finally, the age of mother at last birth and the length of the last birth interval data possibly provided some slim evidence for the replication of behaviour between the textile town's two groups, more so than amongst the workers of the iron town.¹⁹

To conclude this short summary of the main findings of the present research, let us draw out the various themes and hypotheses which require detailed discussion and explanation: firstly, the observed fertility differential between the ironworkers and the textileworkers, and the concomitant differences in certain of their marital and reproductive strategies; secondly, the theme of change over time, particularly with regard to completed family size; and thirdly, the existence of a shadow effect, especially in relation to the actual mechanism whereby it may have operated.

Marital and Reproductive Strategies

It has been proposed that the textileworkers were achieving a smaller family size than the ironworkers, primarily through adopting a reproductive strategy in which they sought to exercise control over their fertility and thereby limit the number of births particularly during the later stages of a woman's childbearing career. In addition, a strategy of slightly later marriage may also have been employed by some in the textile group possibly to achieve a similar result.

If this was indeed the case, then why should the textileworkers have operated such strategies and conversely why did the iron group fail

to adopt such measures? In order to answer this question, let us initially divide the discussion into two main sections. Firstly, let us consider the arguments based upon motivation arising out of economic conditions and secondly, the propositions concerning the acceptability of behaviour primarily designed to limit fertility.

Motivation

The period covered by the 1871 data set was in general a time of favourable economic conditions in the iron town of Falkirk. Indeed the Scottish iron industry as a whole had enjoyed a continued programme of expansion from the 1830s up until the early 1870s and although a period of steady decline was entered thereafter, there is evidence that the light castings sector, mainly located in and around Falkirk, may have been least affected.²⁰ For males in Falkirk, employment was readily available in the iron industry and real wages rose steadily, if not dramatically.²¹ Furthermore the particular type of work required young men who were fit and strong and who, in return, were paid a relatively high wage at an early age. As a consequence, a male worker in the iron industry was economically capable of establishing his independence and moreover of supporting a wife and family whilst still comparatively young. This then may have acted as a positive incentive towards early marriage, or at any rate it did not constitute a barrier.

On the other side of the coin, there were few opportunities for female employment within the iron town and those that were available were generally unattractive.²² Therefore, marriage represented one of the few means whereby a young woman could gain independence from

her own family. Furthermore, as a result of the imbalance in the sex ratio in Falkirk, the demand for young wives coming as it did from a larger number of young men, may have exceeded supply and thus acted to force down the female age of marriage.²³ In this way, the male and female occupational structures operating in Falkirk in the 1860s provided considerable incentives towards early marriage.

Similarly, employment opportunities in the iron town may also have been responsible for encouraging large families. Where men were in receipt of comparatively high wages and women were restricted in their labour-force participation, children may thus have been perceived as low-cost commodity items since the earnings of the male were sufficient to provide the necessary upkeep of the family unit, and the earnings of the female did not have to be foregone. In other words, there may have been little reason for ironworkers in Falkirk in the nineteenth century to have had any fewer children and possibly their reproductive behaviour may have been wholly rational, deliberate and moreover appropriate to the economic conditions of the time.

Furthermore, the earlier fertility data for the period 1835-60 suggested that the ironworkers' completed family size may in fact have been larger at this time, as compared with the later period 1860-90 and this may have been a reaction to the changing economic climate brought about by the overall decline in the iron industry.

Using part of Caldwell's analysis, it would seem reasonable to suggest that the high fertility regime observed for Falkirk's ironworkers was economically rational.²⁵ However, Caldwell goes

further and states that high fertility will be economically advantageous if the intergenerational wealth flow is in the direction of child to parent. With regard to nineteenth century Falkirk, it is rather difficult to elaborate on this point, since detailed information on the role and function of children is lacking.²⁶

Certainly, some work was available in the iron industry for boys between the ages of twelve and fourteen years and this may have acted to encourage a large number of children, since by their early teens the boys at least could begin to contribute to the household economy; however, this is fairly speculative. On the evidence available, I would prefer to conclude that ironworkers in Falkirk in the period 1860-90 had little to discourage them from having a comparatively large average completed family size.

Turning now to the textileworkers, let us see whether a similar degree of economic rationality can be imputed in relation to their lower fertility regime. To begin once again with the age of marriage, we have already seen that more of the women marrying textileworkers did so at a slightly later age²⁷ and furthermore that delayed marriage was perhaps more common in this group, as evidenced by the larger number of illegitimate births.²⁸ So why were some marriages entered at a slightly later age within the textile group from Hawick?

Whereas in Falkirk there was an imbalance in the sex ratio in favour of men, especially in the younger age groups, in Hawick this bias was firmly in favour of the women.²⁹ In addition, there were many

opportunities for female labour-force participation which acted as alternatives to marriage, allowing either a postponement or indeed permanent abstention. Furthermore, the earnings of a male textileworker were not as high as those of his counterpart in the iron group.³⁰ In other words, there was a number of factors operating which may have discouraged early marriage. On the other hand, textileworkers and their wives were in all likelihood still marrying early by national standards³¹ and therefore too much should not be made of their comparatively later marriage.

Moving to the observed fertility differentials, the factor of female employment may again have been important since male earnings were comparatively low, the earnings of the wife may have been very important for the overall household economy and thus their withdrawal when the woman was fully engaged in child-bearing and child-rearing may have been highly disadvantageous. Therefore, children in textile families were perhaps not the same low cost commodities as they may have been within the iron group.

However, in some respects I view the economic-based arguments regarding fertility as more applicable within a twentieth-century, modern contraceptive context. For instance, it was still the case in the 1860s and 1870s, for both groups of workers, that family formation began as a process immediately on the assumption of the married state and in fact it has been shown that in almost half the cases, this started prior to marriage.³² Had couples in the textile group taken full cognisance of the costs of children, then one might have expected that more of their number would have exhibited fewer children during the initial years of marriage when

they were trying to lay the foundation for economic security. However, there is little evidence to support this potential pattern of behaviour.³³

Rather, the evidence contained in previous chapters indicates that the patterns of early reproduction were quite similar for both the iron and the textile groups up until about the age of thirty. Therefore, the consideration of child costs may only have applied to the textileworkers after the woman had entered her thirties. On the other hand, employment for very young children was more available in textiles than in the iron industry and, although restrictions had been placed upon child labour in textile mills and factories by the 1870s, there was still a large amount of potential work for children which could be carried out within the home.³⁴

On a general level, it is therefore difficult to assess the relative costs of children in the textile town, since young children and especially the newborn could have prevented a woman from going out to work and yet on the other hand, she could perhaps have found work that could have been done at home and with which some of the older children could have helped. In the former case, children would be assessed as high cost commodities and in the latter, as low cost items. It seems likely too that the greater potential for female labour-force participation in the textile town is directly associated with the possible adoption of a birth spacing strategy in that the woman's labour force entry at various points throughout the family's life cycle may have required attempts to postpone the next birth. In addition, the comparatively lower wages of the male textileworker may have necessitated the wife entering the workforce

and consequently the motivation for birth spacing may have originated within the economic sphere.

In summing up the economic arguments which might account for some, if not all, of the fertility differential, it has to be said that a firm conclusion is still beyond our reach. One reason for this is the unfortunate level of generality at which the economic evidence exists. It is at this point that the originally intended research design based upon linking individual wage records with the marital and fertility data would have been thoroughly enlightening as it would have permitted an insight into the changing nature of the household economy across the life cycle. As it stands, therefore, causation can only be inferred at a higher level of generality than would otherwise have been wished. On the other hand, the application of some of the economic arguments has helped us move nearer to a plausible explanation of the two groups' distinct patterns of fertility.

Acceptability

Moving away from the economic setting to the environment within the family unit, we must consider whether there were any differences here between the iron and textile groups which might help to account for the variations in reproductive behaviour? It has been suggested that women in the textile industry were more likely to possess knowledge regarding birth control through mixing with others in the workplace and thus being able to discuss the latest ideas.³⁵ However, this presupposes that the ability to exercise control over fertility was a recent occurrence and that female textileworkers

merely had access to this knowledge in advance of certain other groups of women. It is an interesting idea, if only for its emphasis on occupational specificity. I, however, prefer Knodel's refinement of the 'innovation' arguments, in which he states that innovation of behaviour is the important criterion as opposed to innovation of method.³⁶

The key concept here is acceptability, whereby attempting to control fertility, by spacing or stopping procedures, either becomes a part of normative behaviour or remains a deviant act. The phenomenon of the Bradlaugh-Besant trial in 1877 may thus have been important in this context, as it not only gave the subject of birth control a good airing but it also transformed the matter into an issue of topical debate which in turn probably assisted such practices as coitus interruptus to gain both in acceptability and in usage.³⁷

We have seen that a much larger proportion of women in Hawick participated officially in the labour-force, although whether they were single or married remains unknown. In addition, no information was uncovered concerning the composition of the workforce located in the small workshops, which were common in Hawick, and consequently we do not know how many married women had the opportunity to discuss matters of birth control with other women. However, it is likely that many of the women in Hawick will have spent at least some part of their lives either working in one of the workshops or being associated with them in some way and therefore they were probably more likely to know about and perhaps accept the usefulness or legitimacy of fertility control than their counterparts in the iron town.

Following on from this, it may also have been the case that fertility control found a more receptive audience amongst the men in the textile industry. For example, the suggestion has been made that where the husband and wife both participated in the labour-force, a greater degree of equality within the household may have existed and further that this may also have applied to decisions concerning the size of the family, the control of fertility and the well-being of the woman.³⁸ In the iron industry, the male tended to be the sole earner and the household may therefore have been run in a more patriarchal fashion which might in turn reduce the likelihood of coitus interruptus being practised, since obviously it required not just consent on the part of the male but also direct action.

In support of this argument, Lesthaeghe and Wilson have pointed to a process of cultural change as allowing family limitation to become an established practice in western societies and they further propose that secularisation may have been the vital factor.³⁹ Within this overall cultural change they claim that alterations may have occurred within the family decision-making process, so that the woman may have achieved a greater say in matters such as family size and the never-ending burden of pregnancy.

Although no evidence was found in the present research to distinguish between patterns of secularisation in Falkirk and Hawick,⁴⁰ the changing character of household decisions could possibly tie in with the larger amount of labour-force participation by women in the textile town. In other words, if a climate of

greater equality between husband and wife was becoming pervasive (although it is by no means certain that it was) then it may have been better received and more accepted amongst the textile group.

In conclusion, it would now appear feasible to interweave the two strands of the argument in an attempt to formulate an explanation for the alternative marital and reproductive strategies adopted by the workers in the iron and textile industries.

The evidence presented in Chapter Three tends to indicate that male textileworkers earned less than male ironworkers and furthermore that there were more opportunities for wives in the former group to secure employment. Therefore a two-fold motivation for family limitation may have existed, whereby the man's earnings were insufficient to provide for any more children, after a certain number had been reached, and the woman's earnings were required to maintain, or perhaps even raise, the standard of living of the present family unit. Conversely, this same motivational force may have been absent in the iron group where male earnings were higher and female employment was lacking. Therefore the textileworkers more so than the ironworkers, may have had the motivation to limit their fertility or at least to do so to a greater extent.

The presence of an element of motivation would almost certainly have assisted the acceptability of the concept of family limitation on the part of both the males and females in the textile group, although ease of access to information and perhaps joint decision-making within the household may also have played a considerable part in making fertility control more of a reality amongst the

textileworkers, as compared with the ironworkers. All in all then, the textileworkers would seem to have been the group most likely to have limited their fertility, both in theory as well as in practice.

Change Over Time

The second major theme arising out of the present research was the changing pattern of fertility which occurred over time, most notably the proposed decline in fertility which was observed between the 1855 and the 1871 data sets. Moreover, what was seen as particularly interesting was the short space of time within which the alterations took place. So why was fertility declining in both groups in the second half of the nineteenth century?

We can in all likelihood discount a rise in the age of marriage as being responsible for the observed reduction in the completed family size data in 1871, since the evidence suggests that the marriage age remained fairly stable for the two data sets.⁴¹ In order to explore this suggested fertility decline, let us again make use of the two explanatory strands which emerged in the previous section, that is the motivation resulting from economic conditions and the acceptability arising out of cultural change.

The evidence suggests that the most successful period in both the iron and textile industries in Scotland was coming to a close by the early 1870s and although the local economies of Falkirk and Hawick were possibly least affected, due to the particular nature of each sector of the industry, it is possible that the general downturn in the economic climate may have been interpreted as a red light for

high fertility.⁴² Therefore, the possible unrestrained fertility regimes in operation throughout the 1840s and 1850s may no longer have been felt appropriate under the changing economic conditions of the late 1870s and the 1880s.

On the other hand, the economic arguments may be weakened if one considers for a moment the actual process whereby economic decline may have been perceived by individual actors at that time. After all, it is one thing for economic historians to identify a watershed in certain industries as having occurred in the early 1870s and quite another to claim that as a direct result couples began to limit their fertility soon afterwards.

In order adequately to examine this issue, we would need to know on the one hand more about the nature of the economic indicators operating at a local level in the two Scottish towns and on the other, more regarding channels of communication and means of perception. For example, if workers were seen to be laid off, put on shorter hours or have their wages cut, or if prices were seen to rise in advance of earnings, then it seems likely that economic decline would be recognisable relatively quickly. However, such a condensed package of gloom is unlikely to have been unwrapped all at once and therefore the question arises as to the type of indicator and the scale of change which would have been required to sensitise the local population to imminent or progressive economic decline. Perhaps a detailed examination of the local impact of trade cycles, through the local news reports or the compilation of a local standard of living index might provide some relevant information here, although systematic research on neither has been possible

within the remit of this particular piece of research. Consequently, we must remain unsure as to the actual mechanics and the interpretation of any economic decline.

So far, we have considered some of the arguments concerning the reasons behind a potential reduction in fertility but we have avoided any discussion as to how this may have been achieved. The evidence presented in Chapter Eight, particularly in Table 8.7, indicated that compared with the 1855 data, fertility was consistently lower across all age groups in the 1871 data for the ironworkers. Therefore, it would seem that the iron group were having fewer births at every stage within the reproductive span.

For the textileworkers the data is less clear but it is likely that the fertility behaviour adopted towards the end of their childbearing years, which has been characterised as deliberate family limitation, was probably responsible for the lower completed family size of the 1871 group. How then were both these groups of workers actually managing to be responsible for fewer births?

The first approach and potential explanation presented in Chapter Four centred around the innovation in mechanical means of contraception. In other words, it was believed that couples in the past may have already been motivated to limit their fertility at certain times but could not do so effectively in the absence of any reliable methods of birth prevention. Those favouring such an approach then provide evidence regarding the development of such things as the sheath, the douche and the pessary and then try and establish an association between these innovations and the decline

in fertility. The main drawback to this form of analysis is that the reduction in fertility began in some instances in advance of the introduction of such contraceptive devices and almost certainly well before their usage became widespread both socially and geographically.

The second approach to be considered, the adjustment argument, states that birth control knowledge had always been available in the past, especially in the form of coitus interruptus. Since couples possessed the capability for fertility control, so the argument goes, they were able to adjust their reproduction in accordance with a bundle of expectations and assumptions regarding economic conditions. For both approaches, changed economic circumstances represented the trigger for reducing fertility, only the firing mechanism differed. However, as Knodel has pointed out, access to knowledge regarding fertility control may well have been insufficient in itself to guarantee its practical application and consequently a widespread process of cultural change may have been a prerequisite in an overall package of motivational forces.⁴⁴ Only if the limitation of fertility had become normatively prescribed could one possibly expect large sections of the population to adopt such a practice and in all likelihood the existence and strength of this prescription would vary both regionally and from group to group.

If we apply these arguments to the iron and textile groups, then a potential explanation for the observed fertility decline is probably comprised of the various elements within a particular package of motivational factors. For example, changing economic conditions

may have unleashed the desire or the need to limit overall family size, knowledge of coitus interruptus, abstention or abortion may have provided the means whereby this could be achieved and a process of cultural change may have offered the seal of social approval for such behaviour.

To my mind, the key to the reduction in completed family size was located within the realm of cultural change, since it seems likely that both an adverse economic environment and the knowledge of fertility control had occurred at other times in the past. Lesthaeghe and Wilson have put forward secularisation and a greater degree of equality between husband and wife as potentially significant constituent parts, of this cultural change.⁴⁵ However, as already stated, little conclusive evidence has been found which would shed light on the first of these factors in relation to Falkirk or Hawick and it can only be speculated that the greater degree of female labour-force participation in Hawick may have created more equality between husband and wife.

Finally, it is worth pointing out that in the absence of the 1855 data set, it might have been concluded that only the textileworkers were capable of limiting their fertility and moreover that they were just starting to do so in the period covered by the 1871 data, specifically in this context 1870-90. By contrast, the 1855 data set revealed two potentially important trends; firstly, the small amount of evidence for a degree of fertility control within marriage in the case of the textile group and secondly, the suggested decline in the fertility of both groups of workers between the two data sets.

In the light of the 1855 data, therefore, it seems possible to suggest that the very first beginnings of attempts to restrict family size, through a strategy described here as family limitation, were visible, in relation to the textileworkers, as early as the 1850s. In addition, it may also be the case that both the iron and textile workers may have had the capacity to limit their fertility, as evidenced by the suggested decline in fertility for both groups between the two data sets, merely that the latter group exercised greater control over completed family size and furthermore were identified as achieving such an outcome in a very particular manner.

Shadow Effect

A subsidiary line of enquiry running throughout the present research has been the examination of a potential shadow effect, whereby similar patterns of nuptiality and fertility may have been exhibited by workers employed in the dominant industry and by those others who were resident in the same town but who were engaged in other forms of work. It has already been suggested that certain aspects of marital and reproductive behaviour were specific to a particular occupational group, most notably the strategy of family limitation operated by the textileworkers, and now the analysis requires broadened to identify whether such behaviour may also have been locationally-specific.

The evidence presented in Chapter Five demonstrated that the female age of marriage was liable to have been similar for both groups in each of the two towns, as was the length of the last birth interval.⁴⁶ On the other hand, the completed family size data was

identified as fundamentally similar only for the groups in the textile town.⁴⁷ Ultimately however, these were the only measurements which unambiguously indicated the possible existence of a shadow effect. Let us examine each example in turn.

The marked similarity in the female age of marriage is probably best explained by a combination of factors, including the operation of market forces, the local economic climate and various social processes which may have encouraged and positively sanctioned certain marital behaviour. For example, the imbalance in the sex ratio in the iron town seems likely to have created a shortage of young women eligible for marriage, thus forcing the age of marriage down. In addition, the male ironworker's capacity to marry early may have driven the marriage age of women down still further, since the men tended to marry on average two years older than their wives. Early marriage for women may in this way have become normatively established in Falkirk although at the same time permitting greater variation among the men. In the textile town of Hawick market forces were probably less applicable, since young, eligible women were in plentiful supply and therefore normative processes encouraging early marriage may have assumed primary importance.

Turning to the last birth interval data, the evidence showed that a larger number of textileworkers and non-textileworkers had much longer intervals between their penultimate and last births than either group in the iron town. The similarity of behaviour on the part of some of the non-textileworkers seems likely to have been due to the proximity of a role model which emphasised the limitation of fertility in the later years of childbearing. In other words, the

family limitation exhibited by the textile group, of which a long last birth interval was probably a part, (and which was probably regarded amongst textileworkers as normative) could subsequently have spread to others who possibly had some connections with textileworkers and who therefore may have included them in their reference groups, as a result they may have begun to alter their reproductive behaviour accordingly.

The fact that only a very small amount of evidence for the shadow effect was located within the age-specific fertility data in the later stages of reproduction, tends to suggest that the non-textileworkers were only beginning to emulate the behaviour of the textile group in trying to limit their fertility. However, the non-textileworkers were apparently having some success in restricting their completed family size, since their overall number of births was not that dissimilar to the textile group. Interestingly, the greatest similarity is evident in the equally large proportion of smaller families exhibited by both groups.⁴⁸

In conclusion, there is some evidence which supports the hypothesis regarding the existence of a shadow effect, although this is slightly more apparent in the case of the textile town of Hawick. In strict terms, the operation of a shadow effect was initially defined as the 'emulation of behaviour' which tends to suggest a normative component. On the other hand, a similar age of marriage may have been borne more out of expediency in the iron town and therefore an operational definition of the shadow effect would have to include replicated behaviour arising out of a number of different objectives and pressures. However, although certain patterns of

nuptiality and fertility may be applicable to large sections of a local population, irrespective of their form of employment, it should be stressed that occupationally-specific marital and reproductive behaviour has also been observed.

Conclusion

The original driving force behind the design of the present study was the desire to move away from the macro-level analysis of large, aggregated sets of data for whole societies at various periods. It was felt that this level of examination obscured many internal variations and did not readily permit the study of causes and motivational factors. The need for micro-level demographic investigations has often been pointed out and there have also been appeals for such work to examine individual motivation;⁴⁹ however, the response has so far been slow.⁵⁰

In concluding this thesis, it must be said that from the evidence presented I have not been able to firmly establish individual causation in relation to the various patterns of nuptiality and fertility. However, a considerable distance has been achieved in a movement away from general statements regarding fertility behaviour and speculations concerning family limitation to a situation where specific answers to both when and how questions can be provided; that is the various reproductive patterns occurring across the life cycle have been clearly presented and it has further been demonstrated when family limitation was liable to be exercised, as well as indicating how it was most likely to have been achieved.

In addition, possibly the most significant feature of the thesis lies within the realm of methodology, in that it has been demonstrated that record linkage using nineteenth century census enumerators' books and civil registration schedules is indeed both feasible and rewarding. Moreover, the particular selection methods adopted in the construction of the two data sets have helped to identify certain potential difficulties inherent in this type of study. Any pioneering exercise is always liable to stumble into unexpected pitfalls, but by so doing will ensure the relative protection of those who follow. In this way the present thesis represents a major contribution to the development of appropriate methods and techniques in the micro-level study of nuptiality and fertility patterns in the last century and should therefore be able to act as a guide for intending researchers in this field.

From a substantive viewpoint, the thesis has provided clear evidence in support of the major hypothesis concerning the restriction of fertility on the part of textileworkers. Furthermore, it seemed most likely that this group were beginning to operate one or possibly more strategies of marital and reproductive behaviour, deliberately intended to facilitate control over fertility, and which were ultimately designed to limit completed family size. In addition, it has been suggested that the motivation for such behaviour arose out of a bundle of factors, many of which were occupationally-specific to textileworkers. This included the spheres of male and female employment, the position of the local economy and the openness of the group to a developing process of cultural change. Conversely, a similar package of motivational

forces, albeit operating in a different manner, was suggested as responsible for the pattern of higher fertility applicable to the ironworkers.

It has become apparent throughout the preparation of this thesis that any attempt to provide more detailed explanations for particular patterns of demographic behaviour in the past, especially with regard to the twin realms of motivation and acceptability, would require a vast amount of contextual data, both social and economic; for example: wage information for males, females and children and knowledge of prices, so as to facilitate an understanding of the household economy; material on contemporary ideas and their dissemination;⁵¹ and data concerning social relations within families at that particular time. However, this sort of task, even if such information could be located, begins to take on gargantuan proportions when seen in association with the further compilation of a suitable micro-level, demographic data base. On the other hand, one has to say that in light of this, the potential for further research to continue the fine tuning of many areas of historical demography still remains.

APPENDIX A**Occupational composition of four groups of workers****1. Ironworkers**

Description	N	Proportion of Total Sample
Iron Moulder	76	58.9
Iron Dresser	11	8.5
Iron Turner	4	3.1
Iron Grinder	1	0.8
Gratefitter/Smith	16	12.4
Patternmaker	9	7.0
Pattern Filer	1	0.8
Labourer in Iron Foundry	9	7.0
Iron Foundry Warehouseman	2	1.6

2. Textileworkers

Description	N	Proportion of Total Sample
Wool Frame Work Knitter	32	31.1
Wool Hand Loom Weaver	3	2.9
Framesmith	4	3.9
Wool Sorter	12	11.6
Wool Spinner	13	12.6
Wool Slubber	4	3.9
Fuller	5	4.8
Wood Factory Worker	10	9.7
Wood Hosiery Warehouseman	12	11.6

Tweed Cropper	1	1.0
Woollen Warper	2	1.9
Wool Dyer	2	1.9
Tweed Manufacturer	2	1.9
Power Loom Tuner	1	1.0

3. Non-Ironworkers

Occupations Represented:

Carter	Post Messenger
Joiner	Labourer - Timber
Grocer	Labourer - Rope Works
Cooper	Labourer - Agriculture
House Painter	Saddler
Flesher	Boiler Maker
Mason	Potato Merchant
Plasterer	Baker
Mercantile Clerk	Messenger-at-Arms
Blacksmith	Ship's Master
Tailor	Chimney Sweep
Labourer - Tannery	Printer
Plumber	Draper
Engine Fitter	Brush Maker
Wood Carver	

4. Non-Textileworkers

Occupations Represented:

Mason	Coach Trimmer
Slater	Policeman
Baker	Labourer - Railway
Labourer - General	Bookseller
Dyke Builder	Plasterer
Hairdresser	Auctioneer's Clerk
Cabinetmaker	Tobacconist
Joiner	Grocer
Shoemaker	Butcher
Carter	Hatter
Tinsmith	Bank Accountant
Gardener	Ploughman
Shepherd	Sawyer
Nursery Seedsman	

APPENDIX B

Potential Sample Bias

This appendix to Chapter Five will consider in some detail the particular problem in the research design which was uncovered at a late stage in the preparation of the thesis. Firstly, the difficulty will be outlined, secondly, the age of marriage distributions for the four groups will be presented, thirdly, a reweighting of the data will be explained and carried out and finally, a short discussion will take place concerning the legitimacy of the original data as presented in the chapter.

As a reminder, the criteria for selection for any of the groups were as follows:

- (a) a couple had to be married (or living together as husband and wife);
- (b) the wife had to be aged 30 or under;
- (c) both husband and wife had to appear in the 1871 census enumerators' books for Falkirk and Hawick.

This was a deliberately constructed and tightly specified research format which was designed to elicit information concerning family

formation processes in the second half of the nineteenth century in Scotland. In particular, the aim was to study patterns of reproduction at the very beginning of the fertility decline, with a view to casting some light on the possible practice of family limitation by certain narrowly defined groups in the population whose whole fertility careers could be explored; as such, the research strategy adopted is wholly defensible.

However, the rigid specifications of the design format could potentially cause certain potential biases to operate within, and perhaps between, the four groups of workers selected for study. Although it was never an intention to include those who married for the first time after the age of thirty, since there is good reason to suppose that their patterns of fertility would be very different to those marrying in their early twenties, the nature of the research design meant that those marrying close to this cut-off point had much less chance to be selected than those who married earlier. The ensuing potentiality for bias is probably best demonstrated diagrammatically as in Figure B1.

In stark terms, Figure B1 indicates that women marrying at the age of sixteen had up to fifteen times more opportunity to be selected for study than women who married at thirty years of age, although in practice mortality and, to some extent, out-migration would remove a proportion of these cases from consideration by the year 1871. Nevertheless, those who married early did have a greater chance of selection and therefore, in all likelihood, the four groups of workers will be biased, to a greater or lesser extent, towards the 'early-weds'. One result of this may be that the completed family size figures will be larger than would have been the case if an even distribution of ages of marriage from 16 to 30 had occurred. This in itself, however, is not too serious since the major thrust of the thesis lies in the comparison of patterns between the four groups and the observed fertility differential would still operate.

However, if the age of marriage distributions between the various groups, especially between the iron and textile workers, were to differ radically, then doubt would immediately be cast on the validity of the observed fertility differential. For this reason, a careful examination of the age of marriage information for the four groups is required.

Table B1. Age of Marriage Distributions, Four Groups, Married Women Aged 40 and Over.

Age of Marriage	Iron	Non-Iron	Text.	Non-Text
30				
29				
28			1	
27	1		1	
26	1		3	
25	3		2	4
24	3	3	7	1
23	5	2	-	8
22	8	5	2	7
21	10	6	5	3
20	18	6	10	8
19	15	5	6	7
18	7	3	6	5
17	3	1	3	1
16	3		1	
	--	--	--	--
	77	31	47	44

The age of marriage distributions for the four groups of workers, as presented in Table B1, indicate a considerable degree of similarity. Perhaps the only major differences are the bi-modal nature of the textile and non-textile distributions and the concomitant slightly larger proportion of later marriages in these two groups. On an intuitive basis, therefore, the age of marriage distributions do not seem dissimilar enough to invalidate the observed fertility

differential, particularly between the iron and textile groups. On the other hand, in this particular case, intuition is no substitution for statistical analysis.

In order to get a firmer grip on this age of marriage difficulty, a reweighting of the data was carried out, on the assumption that there was a perfect inverse relationship between the age of marriage and the number of years in which a couple were eligible for selection; thus, the earlier the marriage, the heavier the weight. An example of this reweighting process is provided in full in Table B2.

Table B2. Reweighting of Ironworkers' Data, Married Women Aged 40 and Over.

Age of Marriage (1)	N (2)	At Risk(3)	Reweight (4)		Exp. (5)		Mean Fam.Size (6)
			Col. (2)	Col. (3)	Col.(4) x Sum of Col.(2)	Sum of Col.(4)	
30	1						
29	2						
28	3						
27	1	4	0.250		2.490		5
26	1	5	0.200		1.992		10
25	3	6	0.500		4.980		8.3
24	3	7	0.428		4.263		8
23	5	8	0.625		6.226		8
22	8	9	0.889		8.855		8.1
21	10	10	1.000		9.961		8.4
20	18	11	1.636		16.296		8.7
19	15	12	1.250		12.451		9.4
18	7	13	0.538		5.359		9.5
17	3	14	0.214		2.132		11.7
16	3	15	0.200		1.992		10
	--		----		----		
	77		7.73		76.997		
Mean Family Size:			Sum of (col.(6) x col.(5))				
			Sum of col.(2)		= 8.670		
Mean Age of Marriage:			Sum of (col.(5) x col.(1))				
			Sum of col.(2)		= 21.06		

As a result of the figures in Table B2, it becomes possible to produce an alternative estimate not only of the entire age of marriage distribution but also of the mean completed family size figure, by replacing the original numbers marrying at each age (column (2)) with the reweighted numbers (column (5)). This process was carried out for all four groups of workers, although only the female age of marriage distributions were re-calculated since the male age of marriage was not subject to any restrictions in the original research design and therefore it would have been difficult to institute a similar process of reweighting. It is, of course, the female age of marriage which is most important in the study of subsequent childbearing.

Table B3. Mean Number of Births per Family, Married Women Aged 40 and Over, Original and Reweighted Data.

	N	Mean
Iron	77	8.9
Reweighted		8.7
Non-Iron	31	8.4
Reweighted		8.3
Text.	47	8.0
Reweighted		7.9
Non-Text.	44	8.4
Reweighted		8.0

On comparing the original calculations of completed family size with the reweighted figures (presented in Table B3), the most striking feature is the overall similarity for all groups, with the possible exception of the non-textileworkers. Most crucially, the fertility differential, particularly between the iron and textile groups is maintained.

Table B4. Female Age of Marriage Distributions, Married Women Aged 40 and Over, Original and Reweighted Data.

	N	Mean	Lower Quartile	Median	Upper Quartile	Inter Q. Range
Iron	77	20.4	18.4	19.6	21.2	2.8
Reweighted		21.0	19.8	21.0	23.4	3.6
Non-Iron	31	20.6	18.8	20.2	21.4	2.6
Reweighted		21.0	20.1	21.5	22.8	2.7
Text.	47	21.0	18.3	19.8	23.3	5.0
Reweighted		22.3	20.1	22.2	25.5	5.4
Non-Text.	44	21.0	18.7	20.3	22.2	3.5
Reweighted		21.5	20.2	22.3	23.6	3.4

The recalculation of the female age of marriage, as shown in Table B4, indicates a general upward shift in relation to all four groups, although this is slightly more prominent in the case of the textile and non-textile groups. For example, whereas the medians for the iron and non-iron workers increase by 1.4 years and 1.3 years respectively, as a result of the reweighting, the same figures show an increase of 2.4 years in the case of the textileworkers and 2.0 years for the non-textileworkers.

However, the most important criterion is the relative comparability across all four age of marriage distributions following the process of reweighting. For instance, the difference between the reweighted medians for the iron and textile groups is 1.2 years and this is insufficient to explain all of the fertility differential observed in Table B3.

Turning for a moment to the actual mechanism of the reweighting process, it must be noted that this represents a rather brutal

attempt to correct any potential bias in the sample groups. For example, despite the fact that in theory those marrying at sixteen had an up to fifteen times greater chance of appearing in the samples, in fact mortality and out-migration could reduce this figure, I think this only produces random error. Therefore, the particular system of reweighting instituted may be regarded as producing a fairly extreme re-assessment of both the completed family size data and the age of marriage distributions.

In light of this conclusion, it would seem reasonable to suggest that the 'true' values for the mean number of births per family and the age of marriage distributions, for each of the four groups of workers, lie somewhere in between the original figures and the reweighted calculations. Moreover, since the differentials between these two sets of data (the original and the reweighted) are in all cases fairly small, it may further be reasonable to suggest that the range of error, brought about by the inclusion of a source of potential bias in the initial research design, will be very small and as such, will not constitute any significant skews in the original data.

In conclusion, the process of reweighting certain of the data for the four groups of workers has provided a valuable analytic tool in the exploration of potential bias caused by the particular specifications of the original research design. Furthermore, having examined the difficulty, we can now suggest with some degree of confidence that the original data, as presented in Chapter Five, are not affected to any significant extent by the potentiality for bias inherent in the research design.

APPENDIX C

Age-specific marital fertility graphs

Figure 1

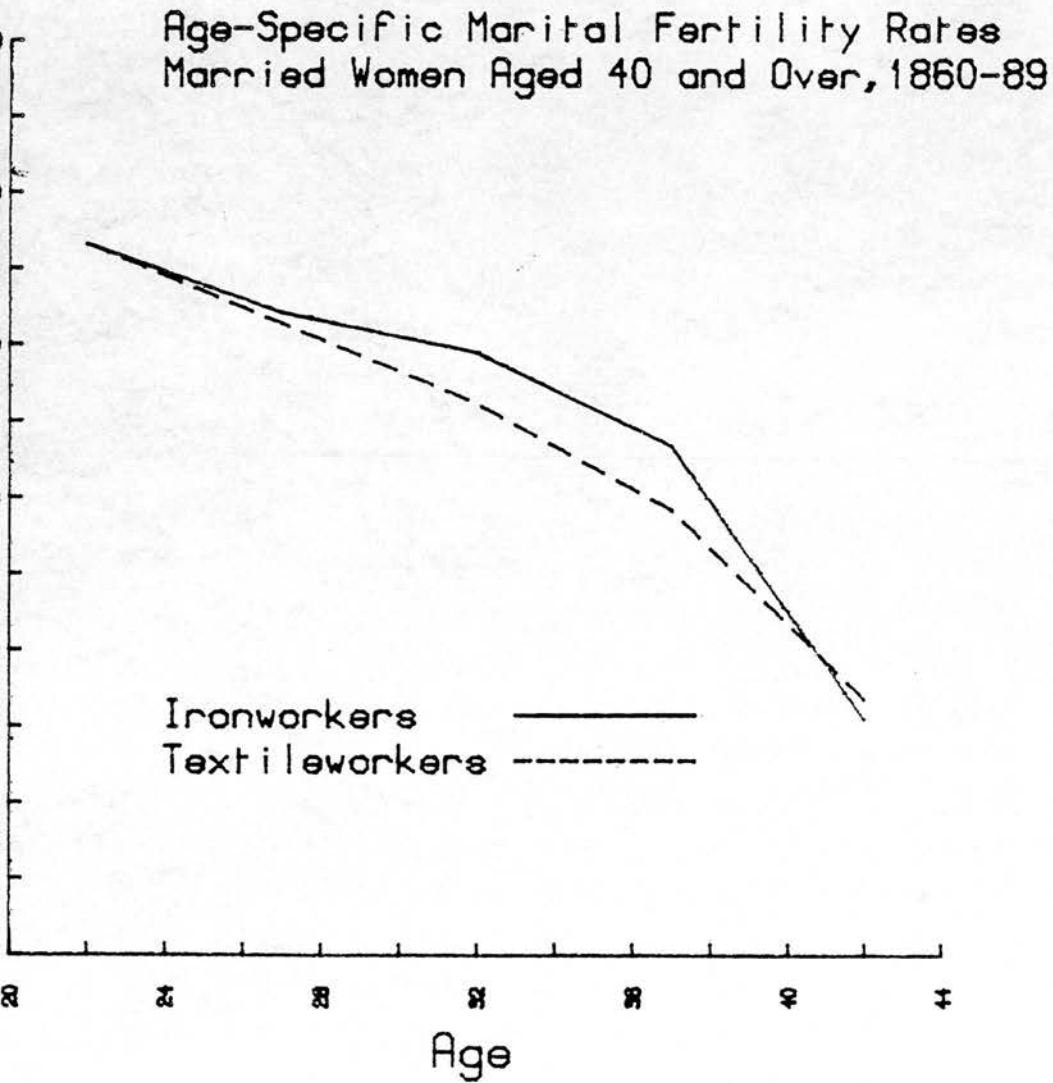


Figure 2

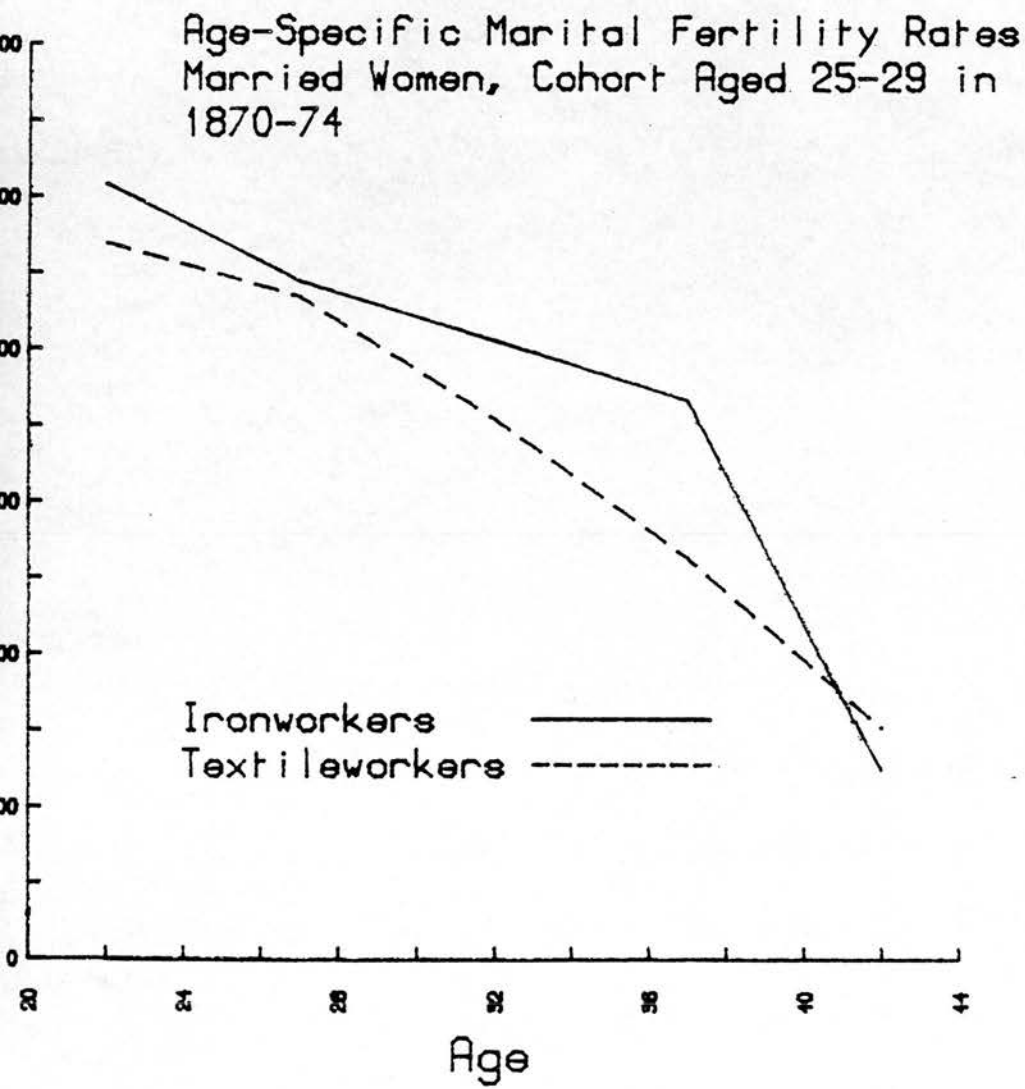
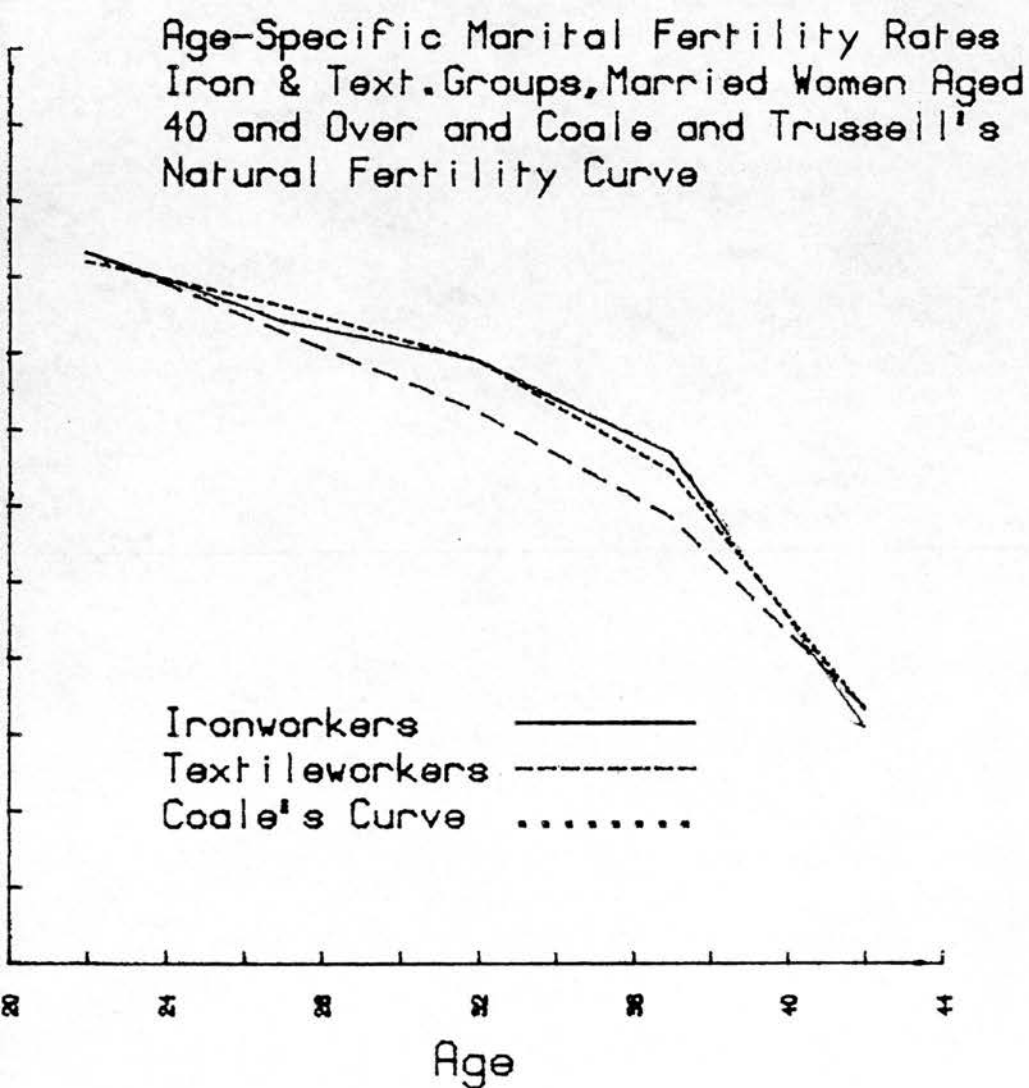


Figure 3



APPENDIX D

Age-specific marital fertility data: number of cases

This appendix contains the actual number of births and the total number of at risk years of married women, in five year age groups, in the four groups of workers which formed the basis for the calculation of the age-specific marital fertility rates presented in the various tables in Chapters Seven and Eight.

Table 7.1. Iron and Textile Groups, Completed Reproduction Only.

	N	15-19	20-24	25-29	30-34	35-39	40-44
Iron	46	15/29	83/172	96/227	95/230	80/230	30/216
Text.	33	6/16	49/102	69/157	60/165	47/165	24/148

Table 7.2. Iron and Textile Groups, Completed and Uncompleted Reproduction.

	N	15-19	20-24	25-29	30-34	35-39	40-44
Iron	105	35/73	225/483	221/525	176/446	125/374	36/232
Text.	74	17/49	160/343	153/370	111/307	68/233	26/155

Table 7.5. Iron and Textile Groups, Age Cohort 25-29 in 1870-74, Completed Reproduction Only.

	N	15-19	20-24	25-29	30-34	35-39	40-44
Iron	31	10/21	62/122	69/155	63/155	56/155	19/155
Text.	20	3/9	30/64	43/100	35/100	26/100	15/100

Table 7.9. Four Groups of Workers, Completed and Uncompleted Reproduction.

	N	15-19	20-24	25-29	30-34	35-39	40-44
Iron	105	35/73	225/483	221/525	176/446	125/374	36/232
N-Iron	56	14/34	119/282	119/280	82/204	44/136	9/83
Text.	74	17/49	160/343	153/370	111/307	68/233	26/155
N-Text.	73	12/34	130/283	147/365	123/309	74/235	24/146

Table 8.7. Iron and Textile Groups, 1855 Data Set.

	15-19	20-24	25-29	30-34	35-39	40-44
Iron	9/11	28/51	31/71	21/50	16/41	6/32
Text.	9/14	35/85	48/105	41/90	22/86	12/76

APPENDIX E**Comparative Age-Specific Fertility Data**

Haines (1979) provides possibly the most relevant figures for the Pennsylvania anthracite region between 1850-1900 as well as for the Durham and Easington registration districts in England's large northern coalfields for the period 1851-71. Haines' data are calculated using age-specific child-woman ratios which are then subjected to certain correcting criteria, taking into account such factors as children not with their mothers, child mortality and adult mortality (Haines, 1979, 125). The outcome of these many statistically sophisticated estimates is described by Haines as an age-specific birth rate which can then be transformed into an age-specific marital fertility rate by making further allowance for the proportions of women married at different ages and at different dates (Haines, 1979, 130-1).

Table E1. Age-Specific Marital Fertility Rates: Pennsylvania Anthracite Region, All Mothers, 1866-70; Durham and Easington Registration Districts, 1866-71; Iron and Textile Groups, Completed and Uncompleted Reproduction, 1860-89.

	15-19	20-24	25-29	30-34	35-39	40-44
Pennsylvania A.R.	782	408	336	302	215	103
Durham & Easington	843	467	390	345	267	105
Iron	479	466	421	395	334	155
Textile	347	466	414	362	292	168

Source: Haines (1979) Table IV-23 and V-13;
Census/Birth Register Linkage.

In Table E1 age-specific marital fertility data is presented for the Pennsylvania anthracite region for the period 1866-70 and for the Durham and Easington districts for 1866-71 as well as for the iron and textile groups from the two Scottish towns. The English figures are higher than the American data in every age group and are most akin to the Scottish data. Surprisingly enough, the Durham and Easington fertility information is closest to that of the Scottish textile town and since the former area is dominated by coal, this is not what might have been expected. Overall, the ironworkers of Falkirk demonstrate the highest fertility rates followed by the textileworkers from Hawick. It might have been expected that the fertility levels in Durham and Easington would have been similar to those in Falkirk rather than Hawick since heavy industry was predominant in both areas; however, there may be a number of explanations for this.

Firstly, the two sets of data have been calculated in different ways. For example, the figures for Durham and Easington are based upon statistical estimates as opposed to actually occurring events and a degree of under-estimation may therefore be present. Furthermore, the calculation of the iron and textile fertility data may have systematically slightly over-estimated the number of births in relation to the number of eligible women (see Chapter Seven, p.161 for discussion).

Secondly, the Durham and Easington material, in the same manner as the Pennsylvania data, not only contains those workers engaged in various types of mining but also all other categories of workers as well. Therefore, due to the research design, the fertility

behaviour of individuals who are employed outwith heavy industry will, as a matter of course, affect the age-specific marital fertility rates of the areas chosen by Haines.

It is subsequently feasible to suggest that something akin to the ecological fallacy may be operating in this context, whereby it is invalid to state that certain patterns of fertility behaviour exhibited by the population of a specific geographic area are being caused by certain occupational characteristics which are further accredited to a predominant form of industrial base. Consequently, to draw a comparison between the Durham and Easington data and the figures for the ironworkers in Falkirk is not strictly a matter of comparing like with like, since the former may be affected by non-mining fertility patterns which may be lower and which would in turn reduce the age-specific fertility rates.

In conclusion, it is therefore slightly difficult to conduct a comparative discussion of age-specific fertility in the setting of the Scottish towns and in the northern coalfield districts of England in light of the different methods of calculating the data. There have, of course, been other attempts to provide age-specific fertility data for the nineteenth century, but I have not reviewed them here, since they have either been of tangential relevance to this research or unsuitable for occupationally-distinct comparisons.

APPENDIX F

The influence of infant and child mortality: an exploratory note.

It was never part of the original research design to include a study of mortality in any shape or form, the main reason being that mortality data at the micro-level for Falkirk and Hawick would have had to have been assembled in a similar manner to the age-specific marital fertility figures (that is through a process of linking census and civil registration schedules). From a time angle, this was an option which was easily dismissed.

However, I have become increasingly aware throughout the preparation of this thesis of the important role that differential rates of infant and child mortality may have played in the formulation of fertility strategies. I therefore considered it necessary to make some inroads in this direction despite the fact that readily available published data in the requisite form only exist at a county level.

The infant mortality rates for Stirlingshire (Falkirk) and Roxburghshire (Hawick) for the period 1871-80 were 115.3 and 111.2 respectively.¹ A similar figure for Scotland as a whole was 122.5.² Turning to child mortality, the age-specific mortality rates for the under five year age group (0-4) were 57.5 and 44.7 for Stirlingshire and Roxburghshire respectively.³ It is therefore apparent that Stirlingshire, in which Falkirk is located, experienced slightly more infant and child mortality under the age of five years than was the case in Roxburghshire.

The main difficulty here is that the mortality figures presented only apply at a county level and there is no way of knowing the appropriate patterns with regard to the individual towns of Falkirk and Hawick, far less for the workers in the iron and textile industries. However, one approach is to examine occupationally-specific adult male mortality data when it first became available in 1905.⁴

If, in using this data, we compare those in wool and worsted manufacture with those workers in iron and steel manufacture in the age range 25-45, then the figures for each are 3.40 and 9.98 respectively (deaths per 1000 in occupational group).

In light of this mortality data, it could perhaps be argued that those workers' wives in Falkirk possibly had a higher fecundity level as a result of the earlier termination of lactation associated with a greater prevalence of infant mortality. On the other hand, it is likely that those wives who did not participate in the labour force would have breastfed longer, thus reducing the period of exposure to conception, and this would have applied more in the case of ironworkers than textileworkers.

In conclusion, the mortality data presented in this brief appendix may perhaps point to differential infant and child mortality as one further potential explanation for the alternative patterns of fertility exhibited by the iron and textile workers. However, this must remain as only a very tentative suggestion, since the mortality figures used either apply at the county level or to occupational groups at a national level and therefore the micro-level approach emphasised throughout the thesis cannot be maintained.

Notes: Appendix F

- (1) Infant mortality rate = deaths under age one per 1,000 live births.
- (2) Scottish data from Flinn et al. (1977) Table 5.5.9.
- (3) Age-specific mortality rate = number of deaths in a particular age group per 1,000 living persons in that age group.
- (4) Supplement to the Forty Eighth Detailed Annual Report of the Registrar General in Scotland, 1905, Parl. Papers, 1906, 21. It is recognised that levels of adult male mortality for different occupational groupings tended also to be fairly representative of the mortality levels of both women and children associated with each occupation.

APPENDIX G

Significance Testing

Certain of the key tables within the thesis have been subjected to tests of significance in order to check against stochastic variation and the results are presented in this short appendix. There is of course considerable debate as to the applicability and appropriateness of significance testing in the social sciences as a whole,¹ and this applies particularly to studies of an exploratory nature such as this one. With regard to the data in this particular thesis, there are two further problems. Firstly, technically, the four groups of workers are not comprised of randomly selected individuals from a population about which inferences are to be made but rather constitute populations themselves. In light of this, the tests applied below are not tests for possible 'sampling error' within the data but rather assist in the assessment of confidence that differences observed are not simply the result of stochastic processes. Secondly, for indicators such as the total marital fertility ratio employed in Chapter 7, no statistical tests at present exist and it was far beyond the scope or purpose of this thesis to seek to develop any.

However, the greatest factor which makes it unlikely that stochastic processes can explain the variation is the consistency with which different subsets of the data produce similar results. For example, the disparity of almost one child between those iron and textile workers who had completed their reproduction (see Table 5.1) is almost exactly paralleled in those who had almost completed their

reproduction (see Table 5.2). Similarly, while the number of marriages which provide the base for each cell in Chapter 7 are sometimes only around thirty, the consistency of the pattern across the tables is unlikely to have arisen by chance. Finally, the fact that, in spite of its small size, the data set used in Chapter 8 produces results which, though not statistically significant, markedly parallel those of Chapter 5 (see especially Table 8.6) seems to suggest a consistency of considerable sociological significance. In other words, the major hypotheses in the thesis do not depend upon any one particular piece of evidence but rather receive support from an array of statistical analyses often conducted for different sub-groups within the data sets.

However, it is reassuring to note that it is unlikely that any of the key findings of this thesis could have arisen through stochastic variation. As far as individual tables are concerned, the following are the results of tests on the data. Two-tailed t-tests were conducted for Tables 5.1, 5.2 and 5.3 (completed family size) and the results indicated that the levels of significance were greater than .10, .05 and .05 respectively. The probability of a result being due to chance is therefore less than 10 per cent in Table 5.1 and less than 5 per cent in the case of Tables 5.2 and 5.3. The same tests of significance were applied to Tables 5.11 and 5.12 (last birth intervals) and here the significance levels were found to be .01 and .10 respectively.

Table G1 T-Tests

Table	T-test value	Level of significance
5.1	1.74	.10
5.2	2.10	.05
5.3	1.99	.05
5.11	2.70	.01
5.12	1.68	.10
8.1	1.48	.20

Therefore, in some instances there is a 10 per cent probability of the intrusion of chance and in which case the null hypothesis may not be rejected quite so easily; however, in other cases a 95 per cent or even a 99 per cent level of confidence is indicated. In the case of Table 8.1 the differences may not be statistically significant, although it must be stressed that this chapter, more than any other part of the thesis, constituted an exploratory exercise and any conclusions drawn were of a tentative nature. Finally, a chi-square test was applied to Table 6.3 (families experiencing an illegitimate birth) and the result indicated that there was only a 1 per cent probability that the variation between the iron and the textile workers was due to chance.

In sum, in the context of the data assembled for this thesis, tests of significance provide a further support to the validity of the claims made by showing that the variations observed for the iron and textile workers would be unlikely to arise if, for example, the completed family sizes or patterns of reproduction were examined for two similarly sized groups of individuals randomly extracted from the 1871 census enumerators' books according to whether their house

numbers were odd or even. To this extent, therefore, we can be confident that there is a 'real' difference of behaviour which requires explanation.

Notes

- (1) See, for example, Atkins, L. and Jarrett, D., 1979, "The Significance of 'Significance Tests'" in J. Irvine, I. Miles and J. Evans, **Demystifying Social Statistics**, London: Pluto

Chapter One: Notes

- (1) See Laslett (1977), Introduction, for the concept of 'perdurance'. Also Laslett (1971) p.93.
- (2) For instance, Flandrin (1979) p.53, is not so quick to relegate the extended family to 'the museum of sociological myths' and instead points to the possibility of considerable variation in household size. Further, Akerman (1981) p.231, provides evidence that in one area of Sweden in the early twentieth century a large proportion of households were organised on a three-generational format.
- (3) For instance, the Princeton series of monographs, e.g. Knodel (1974); Lesthaeghe (1978); Teitelbaum (1985), whilst both important and highly desirable, are primarily concerned with mapping the overall fertility declines of their respective countries and as such cannot highlight possible variation within these populations.
- (4) The pressing need to move from the macro- to the micro-level has been identified in a number of different quarters, for example, Wrigley (1966a) p.97; Harrison (1973) p.20; Tilly and Scott (1978) p.93; Woods (1982).
- (5) Harrison (1973) p.20. An emphasis on regional variation, specifically in relation to the fertility decline, is also made by Woods (1982) who makes an appeal for more micro-level studies of collective biographies in order to gain more detailed insights into the sphere of individual motivation.
- (6) Due allowance is given to the fact that some countries possess more comprehensive historical demographic records than others.
- (7) For a discussion of inheritance practices see, Goody, Thirsk and Thompson (1976).
- (8) In pre-industrial England and Lowland Scotland, wage labour was widespread and therefore not all of the population were totally dependent upon the availability of land in the determination of the timing of marriage.
- (9) Weir (1984).
- (10) Laslett (1971) pp.84-93.
- (11) Stone (1979) p.341.
- (12) Wrigley (1966b) p.165.
- (13) Weir (1984) for example contains a good discussion of the lack of knowledge concerning this matter.
- (14) Wrigley and Schofield (1981) pp.402-412.

- (15) Levine (1977, 1983); Anderson (1983a). For example the availability of work for men and women (or indeed children for that matter) may have considerably affected both the numbers and the ages of those marrying.
- (16) Levine (1977) p.148.
- (17) There are, of course, certain disciplines which concern themselves with intervening factors found within the individual himself, which may also predict and determine behaviour, but these do not concern us here.
- (18) There are two components here, since as well as calculating the proportion of the population ever married, it is also necessary to consider the ages at which both parties, especially the women, entered marriage, as this can have a major effect on the overall length of the reproductive span falling within marriage.
- (19) Sundt (1855).
- (20) Erikson and Rogers (1978). For my part, I should have preferred to know more about Sundt's informants, for example, it would be important to know what proportion of those questioned provided such a response and in addition, whether any of the older brides had in fact been married before.
- (21) Henry (1961a, 1961b); Wrigley (1966b).
- (22) Bourgeois Pichat (1965a, 1965b) regards 'natural' fertility as differing between societies and consequently not reducible to a single format, and in fact he himself presents 280 logically possible types of natural fertility; see Eaton and Mayer (1953) for the classic Hutterite study.
- (23) For an interesting discussion of most of these issues, see McLaren (1977, 1978). Many of these points will be discussed further in Chapter Four.
- (24) For example, Matthiessen (1970); Knodel (1974); Lesthaeghe (1978); Teitelbaum (1985).
- (25) For studies of parishes see, for example, Wrigley (1966b), Levine (1977); for German villages see Knodel (1979a 1979b, 1982); for occupations see, for example, Tilly and Scott (1978), Haines (1979), Gittins (1982); for socio-economic group see, for example, Hollingsworth (1969).
- (26) For instance, it would be incorrect to move directly from the observation that a particular area played host to a number of agricultural labourers, whilst also exhibiting an early age of marriage, to the conclusion that agricultural labourers tended to marry when they were young. For a full discussion of this example see Anderson (1979) p.72. For a good discussion of the ecological fallacy in general, see Galtung

(1967) pp.45-49 and pp.79-80.

- (27) An exception to this is the 1911 Fertility Census.
- (28) A full description of both the data sources and the method of linkage is provided in Chapter Two.
- (29) By contrast, it may be noted that in countries where such civil registration material does not exist (or is not accessible for scholarly research), certain statistical methods based on census data have been developed. One such is the 'own-children' technique which constitutes a process of assigning children to mothers in various age groups in order to construct family units. For a full discussion of this particular technique and its drawbacks, see Haines (1979) pp.95-96, 117-123, 182-185.
- (30) The pressing need for such work has been pointed to in the Scottish context, see Flinn et.al. (1977) p.344 and elsewhere Knodel (1974) p.34.
- (31) Haines (1979) p.2.
- (32) Ibid. To my mind this statement tends to be a catch-all clause in his work and is one which is never fully explained.
- (33) Haines (1979) p.2 mentions all these factors as potentially occupationally-specific in character.
- (34) See Harrison (1973) pp.45-52.
- (35) Wrigley (1961).
- (36) Haines (1977a, 1977b, 1979).
- (37) Friedlander (1973).
- (38) Anderson (1971).
- (39) Levine (1977).
- (40) Tilly and Scott (1978).
- (41) See for example, Bell (1907) p.178, 239; Wrigley (1966b); Friedlander (1973); Anderson (1976b).
- (42) See Haines (1979) pp.46-48.
- (43) See Bell (1907) pp.223-224.
- (44) Ibid. p.178. The association between employment opportunities for women and a later age of marriage was, to my knowledge, first put forward at the beginning of the nineteenth century by S.W. Nicoll in his 'A View of the Principles on which the Well-Being of the Labouring Classes

Depends', London, 1819, pp.22-23. This work is cited in McLaren (1978) p.47.

- (45) Flinn et al. (1977) p.328; Haines (1979) pp.37-57.
- (46) For some of the better economic arguments concerning fertility see, Becker (1960) for the original statement; Easterlin (1969, 1978).
- (47) See Anderson (1976b).
- (48) For a discussion of wage levels, see Chapter Three below.
- (49) Census of Scotland (1911) Vol. III, Table XLVIII.
- (50) See above, p.9.
- (51) See Lockridge (1983) for the concept of 'pioneers' within the overall fertility decline.
- (52) For example, Wrigley (1961); Friedlander (1973); Tilly and Scott (1978).
- (53) Haines (1979). Even if some separation were to have been achieved between coal mining and metallurgy, the result might be misleading since the latter includes ironstone miners. Since they were engaged in an extraction process, similar in nature to coal mining, it is reasonable to suggest that they may have had more in common with coal miners than with other workers in the iron industry. This point is made by Bremner (1869) p.34. In addition, iron moulding was a skilled trade, paying higher wages than ironstone mining, see Johnston (1974) p.368).
- (54) In particular, see Tilly and Scott (1978).
- (55) Anderson (1971); Levine (1977); Holley (1978,1981); Collins (1979).
- (56) It is worth noting at this stage that the mode of production operating in this particular framework knitting town was very different to that which has been previously researched, since in the Scottish border town of Hawick the knitting frames were generally centralised in small workshops as opposed to the custom in Leicestershire, Nottinghamshire and Derbyshire where the domestic mode of production prevailed. The exact nature of wool framework knitting in Hawick will be returned to at greater length in Chapter Three.
- (57) The idea of reference group pressure is discussed at length in Anderson (1976b) and also in Wrigley (1972), Introduction.
- (58) See Chapter Two and Nine below.
- (59) Anderson (1983b). See Figure 6.

Chapter Two: Notes

- (1) Cited in Knodel (1974) p.128.
- (2) For the iron industry see Fyrth and Collins (1959) p.54.
- (3) I am grateful to Bill Lind, Secretary of the Business Archive of Scotland for this point.
- (4) Fyrth and Collins (1959) p.23.
- (5) Ibid.
- (6) The wages records for Ballantyne's have been used by Gulvin (1973) and by Holley (1978); Holley also made use of the wage data for Cowan's.
- (7) The reference for this document is NRA(S) 0531.
- (8) The reference is SRO GD58/16/10.
- (9) The fact that some of the Iron Works round Falkirk gave loans to some of their workers is referred to in Fyrth and Collins (1959) p.93.
- (10) Cadell (1913) p.191; Bremner (1869) p.47.
- (11) Fyrth and Collins (1959) p.40.
- (12) Cadell (1913) p.191.
- (13) For a discussion see Fyrth and Collins (1959) p.80 and 92; this topic is explored further in Chapter Three pp.45-46.
- (14) For example, in the framework knitting centres of Leicestershire, Nottinghamshire and Derbyshire, the domestic mode of production has been analysed by Levine (1977), although this material refers to a slightly earlier period than that under review in the present thesis.
- (15) Birth registers were only compiled for each parish and consequently temporary, short-range migration could perhaps allow errors in the data if children were born and registered in another parish prior to the parents returning to the original parish. By using the census as a back-up system any children born elsewhere will in all likelihood be located in the census schedule. It may be worth noting here with regard to the availability of census enumerators' books that access is achieved sooner in Scotland. Therefore statements like "no censuses after 1871 have yet been released by the British government for public use" (Haines, 1979, p.165) are seen to be wholly fallacious when it is understood that the 'hundred year rule' only applies to England and Wales.

- (16) Initially both the parishes of Falkirk Burgh and Landward were used to provide the sample groups; however, the latter was quickly excluded as it contained few ironworkers.
- (17) For a full discussion of the shadow effect, see Chapter One, pp.17-18.
- (18) For the ironworkers, textileworkers and non-textileworkers every 'young married couple' was recorded and entered into the final working sample; but in the case of the non-ironworkers the numbers available proved too large and therefore only every second couple was finally selected. Coal miners were excluded from the non-ironwork group as they were considered too similar to the ironworkers.
- (19) Blacksmiths were not included as their occupation may be somewhat ambiguous in that it may represent either a traditional craft or an industrial occupation.
- (20) A complete list of the exact occupations covered by all four groups of workers is provided in Appendix A.
- (21) This particular piece of information was omitted from the birth schedules 1856-1860.
- (22) In second and subsequent linkages, it was possible to use the date and place of marriage as a further check that the same family unit was being linked.
- (23) For a discussion of extreme ages in women giving birth, see Census of Scotland, 1871, p. LXVII.
- (24) It would seem that this phenomenon of mis-reporting the date of marriage tended to increase with age, indicating either a simple flaw in the human memory or perhaps a more sociologically interesting disregard for the importance of one's marriage day.
- (25) For the importance of the last day of the year as a time for marriage, see Gilloran (1979); Smout (1981).
- (26) Information relating to the deceased's place of birth and also the length of time spent resident in the parish where the death occurred was provided, which would be invaluable to anyone studying migration patterns, although to my knowledge this source has never been used in any comprehensive manner.
- (27) For a further discussion, see Chapter Eight above.
- (28) This figure represents 16 per cent of the total number of births in Larbert in 1855.
- (29) The parish of Larbert actually included Carron Iron Works and many of the neighbouring villages which housed a good proportion of Carron's workforce; however, it was not

possible to include this parish in the original research design for the 1871 data base since the searching of two sets of birth registers for two distinct parishes would have been too time-consuming.

- (30) The late finishing date is simply explained by a desire not to miss any late births which might have proved interesting.

Chapter Three: Notes

- (1) Hamilton (1932) p.159.
- (2) Alternatively known as 'smashers' (presumably not a reference to their looks).
- (3) Described vividly by Faujas de St. Ford on his visit to Carron in 1784, quoted in Cadell (1913) pp.178-9; see also Nimmo (1880) p.294.
- (4) See, for example New Statistical Account (1840) for Falkirk; Bremner (1869) p.46; Nimmo (1880) p.307; Hamilton (1932) p.161.
- (5) See in particular New Statistical Account (1840) for Falkirk; Hamilton (1932) p.177.
- (6) Campbell (1965) p.121.
- (7) See, for example Hamilton (1932) p.186; Campbell (1965) p.121; Lythe and Butt (1975) p.193.
- (8) Campbell (1965) p.121.
- (9) See Bremner (1869) pp.35-40.
- (10) For a discussion see Landes (1969) p.91.
- (11) Campbell (1961) p.159; Campbell (1965) p.117.
- (12) See Fyrth and Collins (1959) p.92.
- (13) Census of Scotland, 1881, Table XV. See Appendix A for the high proportion of ironmoulders in the iron group.
- (14) Campbell (1961) p.239.
- (15) See Campbell (1965) p.115.
- (16) Wells (1972) p.25.
- (17) Robson (1947) p.88.
- (18) See Watson (1868) for this point.
- (19) Ibid.
- (20) Ibid.
- (21) See Harrison (1973) p.55.
- (22) See, for example, Campbell (1965) p.116; Felkin (1967) p.468.

- (23) Harrison (1973) p.56.
- (24) See, in particular, Royal Commission on Frame Work Knitters (1945) p.64; also Wells (1972) p.106.
- (25) For a discussion, see Felkin (1967) p.461; Wells (1972) pp.63-71.
- (26) Wells (1972) p.139 and p.154.
- (27) See Haines (1979) p.46.
- (28) For a discussion of this issue, see Chapter 4 below, pp.79.
- (29) The total workforce is here defined as the total number of persons at all ages less scholars and children of no stated occupation.
- (30) See Fyrth and Collins (1959) p.20.
- (31) Cited in Campbell (1961) p.228.
- (32) See Marwick (1936) p.141; Fyrth and Collins (1959) p.20, note 1.
- (33) Wells (1972) pp 126-7.
- (34) See Johnston (1974) p.313.
- (35) Wells (1972) pp.127-8.
- (36) Felkin (1967) p.459.
- (37) Ibid Wells (1972) p.36.
- (38) Wells (1972) p.70.
- (39) Ibid. p.125-6.
- (40) Ibid. p.125.
- (41) See Bowley (1900) p.120.
- (42) See, for example, Marwick (1936) pp.148-9; Fyrth and Collins (1959) p.34; Johnston (1974) p.368.
- (43) Johnston (1974) p.369.
- (44) See Bremner (1869) p.46.
- (45) Johnston (1974) p.370.
- (46) Fyrth and Collins (1959) p.41.

- (47) See Nimmo (1880) p.51; Landes (1969) p.218.
- (48) Bremner (1869) p.51; Landes (1969) p.218.
- (49) Johnston (1974) p.368.
- (50) Wells (1972) p.139.
- (51) See Gulvin (1973) p.171.
- (52) See, for example, Johnston (1974) p.368; Haines (1979) p.40.
- (53) New Statistical Account (1840) for Falkirk.
- (54) See Marwick (1936) p.173 for general discussion.
- (55) For this point, see Bremner (1869) p.47.
- (56) New Statistical Account (1838) for Hawick.
- (57) Robson (1947) p.91.
- (58) See Johnston (1974) p.281.
- (59) This phenomenon has been noted by Haines (1979) p.28.
- (60) See Holley (1978) Chapters 5 and 6.
- (61) For example, Anderson (1976b).
- (62) The calculations in this table include widows as it is those never married with whom we are concerned
- (63) See Table 3.3 above.

Chapter Four: Notes

- (1) Anderson (1976b) p.57. This closely resembles the Durkheimian concept of the 'conscience collective'.
- (2) Bourdieu (1976) p.119.
- (3) Wrigley and Schofield (1981) p.417. This point has already been made in Chapter One.
- (4) Flinn et.al. (1977) Table 5.2.2, p 318.
- (5) See, for example, Holley (1978); Haines (1979).
- (6) Haines (1979) pp.37-57.
- (7) See, for example, Anderson (1976b); Haines (1979) p.53.
- (8) See above, pp.12-13.
- (9) For example, Anderson (1976b); Haines (1979) p.46; Gittins (1982).
- (10) Hewitt (1958) p 3; Tilly and Scott (1978).
- (11) See Anderson (1971).
- (12) See Collins (1979).
- (13) For example, Bell (1907) p.178; Haines (1979) p.46.
- (14) Bell (1907) pp.178-9, pp.222-24.
- (15) For a discussion of the effect of women's employment opportunities, see Anderson (1971, 1976b).
- (16) Quoted in Holley (1978) p 111.
- (17) See, Mrs. Pember Reeves, 'Round About a Pound a Week, 1913, extract in Keating (1976) p.311.
- (18) See, for example, Hewitt (1958) pp.128-9; Anderson (1971); Gittins (1982) p.105 and 138. Unfortunately it was not possible to discover whether this practice was true for the Scottish border town of Hawick.
- (19) Wrigley and Schofield (1981) pp.417-435.
- (20) Glass (1938).
- (21) Levine (1977, 1983); Anderson (1983)
- (22) See the discussion of the shadow effect in Chapter One pp.17-18 and Chapter Two p.28 Gittins (1982) has looked at

motivational factors in the exercise of family limitation, albeit for the period 1900-39; Woods and Smith (1983) have pointed out the need for micro-level studies in this area.

- (23) See Gilloran (1979); Smout (1981).
- (24) Ibid.
- (25) Flinn et.al. (1977) p.331, for the age at first marriage figures see Table 5.2.8.
- (26) The sphere of illegitimacy will be discussed in Chapter Six.
- (27) See Henry (1961a, 1961b).
- (28) Davis and Blake (1956).
- (29) Easterlin (1978) p 71; Duncan (1866) p.117 gives an estimate of 12.
- (30) Eaton and Mayer (1953).
- (31) Quarterly Journal of the Royal Statistical Society (1848) pp.193-249.
- (32) Duncan (1866) p.116.
- (33) See Frisch (1978).
- (34) Davis and Blake (1956) provide a useful checklist of factors affecting fertility and many are applicable and relevant to an uncontrolled fertility regime.
- (35) For instance, Easterlin (1978) p.73 believes that there is little or no evidence to justify the existence of conscious practices by the population of methods to limit family size.
- (36) See Himes (1936).
- (37) For this view, see Peel (1963).
- (38) For France the fertility decline is put as beginning in the late eighteenth century, see Flandrin (1979).
- (39) This view is put forward, for example, by Himes (1936); Banks (1954); Elderton (1914) on the other hand tends to sit on the fence, see especially the comments on p 233.
- (40) The proponents of this view include Carlsson (1966); Knodel (1974); McLaren (1978).
- (41) Flandrin (1979) p.194.
- (42) See Peel (1963).

- (43) For example Banks and Banks (1954); Banks (1954) p.149 sees "a real awakening of birth control propaganda" as occurring before this in the 1860s.
- (44) Banks (1954) p.168; see also Banks (1981).
- (45) For example, this point is made by Elderton (1914); Gittins (1982).
- (46) Gittins (1982) provides an extended discussion of this topic.
- (47) Elderton (1914) p.212.
- (48) Gittins (1982). This interesting point, the underlying theme of which concerns power and decision-making within the family unit, will be taken up again later in this section.
- (49) For example, Carlsson (1966); McLaren (1978).
- (50) McLaren (1978) p.220.
- (51) Coitus interruptus was sometimes referred to in nineteenth century vernacular as 'making a coffee-house of a woman', in that one went in and out and yet spent nothing, see 1811 Dictionary of the Vulgar Tongue (cited in McLaren (1978) p.119). The modern Edinburgh equivalent is to 'get off at Haymarket'.
- (52) Flandrin (1979) p.223; see also Gittins (1982).
- (53) Namboodiri (1972) p.187.
- (54) McLaren (1978) p 228.
- (55) Ibid. p.124 and p.246.
- (56) Ibid. p 247; Roberts (1979) pp 127-8.
- (57) McLaren (1978) pp.231-2.
- (58) For instance, 'women in the past' is used as the unit of analysis by McLaren (1978) see in particular Ch.13.
- (59) For a full discussion, see Carlsson (1966).
- (60) Knodel (1977).
- (61) Ibid.
- (62) Lesthaeghe and Wilson (1982).
- (63) Lockridge (1983).
- (64) Gittins (1982); Caldwell (1981) on the other hand sees this argument as probably only responsible for slow declines in

fertility before the main transition.

- (65) Banks and Banks (1954). In Scotland, reports of the trial appeared in The Scotsman on the 22nd and 29th of June 1877.
- (66) See Becker (1960) for an initial statement.
- (67) Ibid; Easterlin (1978) pp.60-69.
- (68) Easterlin (1978) p.82.
- (69) Becker (1960) p.212 provides a good summary of Malthus' arguments.
- (70) Becker (1960).
- (71) See Bumpass and Westoff (1970) for the concept of 'perfect contraception'.
- (72) See Easterlin (1978) pp.81-2 and p.100.
- (73) Ibid. p.105
- (74) The possibility of the spacing of births does not come under this heading.
- (75) See, for example, Mincer (1963); Becker (1965); Schultz (1974) p.6 and p.12.
- (76) Easterlin (1979) p.41 and p 49.
- (77) Mention has already been made of married women in textiles where the children were cared for by, for example, their grandmothers, see below p.77.
- (78) Easterlin (1978) p.66.
- (79) See for example, Duesenberry (1960); Blake (1968); Ryder (1974).
- (80) Easterlin (1969) pp.127-8.
- (81) Ibid. p.135.
- (82) Namboodiri (1972).
- (83) For example, see the work of Cockerill-Tanner (1979).
- (84) Leibenstein (1974) p.471 makes this point.
- (85) Caldwell (1976, 1978, 1981, 1982).
- (86) Caldwell (1982) p.338.

- (87) Caldwell (1976).
- (88) Caldwell (1982) p.333. Lesthaeghe and Wilson (1982) have suggested 'support flows' as an alternative label for this concept.
- (89) Caldwell (1981).
- (90) Caldwell (1982) p.338.
- (91) For a sound assessment of Caldwell's theories see Woods (1982) pp.167-8.
- (92) Lesthaeghe and Wilson (1982).
- (93) Ibid.
- (94) According to the evidence presented by Lesthaeghe and Wilson (1982) this hypothesis would seem to be supported by empirical findings.
- (95) Lockridge (1983).
- (96) Ibid. p.54.
- (97) Ibid. see Ch.5. Lesthaeghe and Wilson (1982) use, as their measure of secularisation, the proportion voting socialist in elections in the late nineteenth and early twentieth centuries.
- (98) Knodel (1977).
- (99) See, for example Caldwell (1982); Lockridge (1983); Woods and Smith (1983).

Chapter Five: Notes

- (1) See Chapter Two, below, for a discussion of the non-ironworkers and non-textileworkers
- (2) For example, see Tilly and Scott (1978); Haines (1979); Gittins (1982). For exact figures see Census of Scotland (1911).
- (3) The data refer to marriages mostly conducted in the period 1860-71 and therefore the resulting period of childbearing encompasses 1860-90. Couples were adjudged to have completed their reproduction if the wife was aged 45 or over at their last appearance in the record linkage.
- (4) Couples were categorised as having 'almost completed reproduction' where the wife was aged between 40-44 years at their last appearance in the record linkage.
- (5) Here, as in the remainder of the thesis, 'married women aged 40 and over' refers to those with completed reproduction plus those with uncompleted reproduction, but where the wife was between 40-44 years of age when the last record was linked.
- (6) For a detailed exposition of the reweighting process, see Appendix B.
- (7) See Appendix B for the exact method of calculating the reweighted figures.
- (8) Further reinforcement of this differential in completed family size comes in Chapter Seven below especially in relation to the total marital fertility ratios presented in Table 7.5.
- (9) Namely those who were married and where the wife was thirty years of age or younger in 1871.
- (10) Census of Scotland (1911), Vol. III, Table XLVIII. The figures for occupations are not broken down by age of marriage nor by duration of marriage.
- (11) Haines (1979) p.116, Table IV-14.
- (12) See Chapter One, p.5.
- (13) For example, see Bourdieu (1976) p.120; Wrigley and Schofield (1981) p.268.
- (14) It has been proposed that for each year earlier that a woman marries, the completed family size will increase by 0.36. See Lorimer's 'hypothetical fecundity model' cited in Levine (1977) p.64.

- (15) In the case of two males in this group this constituted a second marriage and therefore neither were included in the calculations for this nor the subsequent table. The same applies to Tables 5.18 and 5.19, where two non-textileworkers are also omitted.
- (16) Flinn et.al. (1977) p.331. They do provide a regional breakdown of the age of marriage in Table 5.2.9 but remarriages are included which will distort the first marriages data.
- (17) See Chapter Four pp.73-83.
- (18) See Chapter Three pp.62-64.
- (19) See Chapter Three pp. 49-51.
- (20) See Chapter Three pp.44-46.
- (21) See Chapter Three pp.52 55 for a discussion of this point.
- (22) See Chapter Three p.64.
- (23) See Chapter Three pp.50-51.
- (24) See Chapter Three pp.47-48.
- (25) This point has been made by Braun (1978).
- (26) Haines appears to shy away from clearly stating the method of sampling for the Pennsylvania data, preferring in the text such vagueness as "the enumerators' manuscripts of the U.S. censuses of population from 1850 to 1900 were sampled". Subsequently in a footnote though, Haines does provide the number and proportions ultimately sampled, although with proportions such as 8.02, 4.73 and 3.78 from the 1850, 1860 and 1870 censuses respectively, one is left wondering as to the format of the initial research design. Further, in the same note Haines states that "it would have been desirable to have had roughly equal sample sizes at all dates, but the way the samples were originally taken mitigated against this outcome". No mention is made as to either why this would have been desirable or more importantly, how the samples were in fact taken (see Haines, 1979, 93-5, 166-7).
- (27) For example, see Wrigley (1966a); Knodel (1979a).
- (28) This is one of the traditional reasons given by Wrigley along with a change of mind and the replacement of a dead child. However, other reasons for instance, the health and well-being of the mother may also enter the picture.
- (29) Knodel (1979a).
- (30) Dupaquier and Lachiver (1969).

- (31) See, in particular, Knodel (1981).
- (32) The existence of premarital pregnancy in the iron and textile groups will be investigated in Chapter Six.
- (33) Data sets using marriage cohorts, like those utilised by Knodel, would be best suited for this sort of investigation.
- (34) The issue of infant and child mortality in relation to the iron and textileworkers is briefly discussed in Appendix F.
- (35) See, for example, Knodel (1974) p.150; Knodel (1981); Lockridge (1983).
- (36) It is therefore hoped that work currently in progress on Swedish provincial doctors' reports, described as frequent and detailed will enable a map of nursing practices in nineteenth-century Sweden to be established and furthermore that this may be interconnected with existing demographic work so as to allow a comprehensive account to be given of breastfeeding practices and their concomitant effects. See Lockridge (1983).
- (37) For a list of the occupations included in the non-iron and non-textile groups, see Appendix A.
- (38) See below Chapter Nine.

Chapter Six: Notes

- (1) The quotes are taken from G. Seton, *The Causes of illegitimacy*, particularly in Scotland, Edinburgh, 1860, cited by Smout (1976).
- (2) *Quarterly Returns to the Registrar General* (1863), 33, p.45.
- (3) Smout (1976) pp.62-81.
- (4) Hair (1966, 1970).
- (5) Laslett (1977) pp.128-130.
- (6) For example, see Hair (1970) p. 61.
- (7) See Wrigley's article in Outhwaite (1981).
- (8) The number of families used to provide this prenuptial conception data is much larger than the numbers with completed and almost completed reproduction used in the Tables in Chapter Five. The data do not include those family units which had illegitimate children.
- (9) It should be noted that the bias towards the 'early-weds' in the sample groups may be affecting the proportions of couples experiencing a prenuptial conception, although at this stage it is unclear as to the exact nature of this potential bias with regard to this data. For example, much will depend upon the actual context of prenuptial pregnancy within the two Scottish towns and this will be discussed below.
- (10) The same point is made by Scott and Tilly (1975) and Haines (1979). This same argument will be picked up later in the chapter.
- (11) Gaunt (1977). See also Medick (1976).
- (12) Smout (1976).
- (13) For a discussion of the concept of 'marriage frustrated' see Levine (1977) Ch. 9.
- (14) Calculations for this table were made as follows: the number of unmarried women were extracted from the 1871 1881 and 1891 decennial censuses (these figures were not available for either town in 1861) an average figure for 1871-81 and 1881-91 was taken to indicate the number of unmarried women in each decade the number of illegitimate births was taken from the *Quarterly Returns to the Registrar General* 1871-90. It should perhaps be noted that the illegitimate fertility rate is still not the ideal measurement of illegitimacy when two or more areas are being compared since it is unable to allow for variations in the age distribution of unmarried

women within the 15-45 age range. Therefore a more accurate measure would be an age-specific illegitimate fertility rate however, this would require precise information regarding the ages of unmarried mothers at the birth of their illegitimate children. This has not been possible in the context of the present research.

- (15) See Chapter Three, below, Tables 3.3, 3.4 and 3.5.
- (16) See below p.148 and p.150.
- (17) See Chapter Five, Tables 5.5 and 5.6.
- (18) Scott and Tilly (1975).
- (19) Smout (1976); see also Cramond (1888).
- (20) For a discussion of this see Laslett et.al. (1980) p.41 and pp. 63-4.
- (21) Reporter to the Royal Commission on Employment of Women and Children in Agriculture, 1867, cited in Smout (1976).
- (22) Smout (1976).

Chapter Seven: Notes

- (1) For example the age-specific fertility data presented by Haines (1979) is based purely on estimated figures.
- (2) The two five year time periods 1860-64 and 1865-69 are included in an effort to provide maximum information, although it should be noted that their numbers are incomplete.
- (3) See Chapter Five, Tables 5.5 and 5.6.
- (4) See the appendix to Chapter Five (Appendix B) for the complete age of marriage distributions.
- (5) At this juncture it would have been beneficial to introduce age-specific fertility data from elsewhere in order to place the iron and textile figures into some sort of context. Haines (1979) provides the most relevant figures but since the methods of calculation are so different (his are based on estimates) it was not considered worthwhile to include either the data or a discussion in the main text. Instead the material has been set aside in an appendix to this chapter, see Appendix E.
- (6) Coale and Trussell (1974, 1975).
- (7) Henry (1961).
- (8) Where $r(a)$ is the observed marital fertility rate at age a
 $n(a)$ is the standard or natural fertility rate at age a
 M is a scale factor indicating the underlying level of fertility
 m is a factor indicating the amount of family limitation
 $v(a)$ is the standard value of departure from natural fertility at age a .

Coale and Trussell's values for $n(a)$ (1974) and $v(a)$ (1975) are:

	20-4	25-9	30-4	35-9	40-4
$n(a)$	0.460	0.431	0.395	0.322	0.167
$v(a)$	0.000	-0.279	-0.677	-1.042	-1.414

- (9) See, for example, Wilson (1984)
- (10) See Knodel (1977).
- (11) Personal communication to Knodel, cited in Knodel (1977).

- (12) Coale and Trussell (1974) p.187, footnote 7.
- (13) With specific regard to the possible existence of birth spacing among the textileworkers there is some evidence in Table 5.14 below that the birth intervals for this group were slightly longer than those for the ironworkers. However, the discussion following this table points out that the investigation of birth spacing in the past is particularly difficult as it involves the accumulation of a considerable body of both quantitative and qualitative information. For a graphical comparison of the age-specific marital fertility schedules for the iron and textile workers with Coale and Trussell's 'natural' fertility schedule see Figure 3 in Appendix C.
- (14) Wrigley (1966b).
- (15) See Appendix D for the number of cases.

Chapter Eight: Notes

- (1) This differential was demonstrated in both the original and the reweighted completed family size data in Chapter Five, see Table 5.1 to 5.4. Furthermore, it was also importantly seen to exist in the cohort analysis in Chapter Seven, according to the total marital fertility ratios, see Table 7.5.
- (2) See the discussion in Chapter Four pp.85-86.
- (3) See Flinn et.al. (1977) pp.45-57 for discussion of this point.
- (4) For a full account of the 1855 data set's method of selection see Chapter Two pp.36-40.
- (5) Although the original mean figures for the 1871 data set are liable to have been the most erratic, in view of the skew towards the early married, it should be stressed that these means were lowered by the reweighting process thus creating a larger differential in terms of a comparison with the 1855 data. Furthermore, the medians in Table 8.2 also indicate a similar pattern of declining fertility, albeit to a lesser extent.
- (6) The male age of marriage distribution in the 1871 data set is not directly affected by the same bias as the female distribution, since no restrictions on male marriage age were placed in the original research design. On the other hand, a fairly close correspondence between male and female ages of marriages was apparent across all four groups of workers and therefore it could be argued that the male age of marriage distribution was indirectly influenced by the female age of marriage distribution and consequently potentially biased in a similar fashion.
- (7) On balance, however too much should not be made of the data in Table 8.4, as a result of the various problems of comparability, and the main reason for their presentation lies in the desire to provide a continuous link between the discussions in this chapter and those in the rest of the thesis.
- (8) Due to the relatively small number of cases upon which the 1855 calculations are based, only the means are displayed as it was felt that a comprehensive quartile analysis of the distributions would have proved unsatisfactory.
- (9) The average figure arrived at for 1855 represents $1851 \times .5$ plus $1861 \times .5$. It could however be strictly argued that 1855 is closer to 1851 and therefore a formulation of $1851 \times .6$ plus $1861 \times .4$ might be more accurate.

- (10) It was not considered worthwhile to include any age-specific fertility data for the four groups, since attempting to identify patterns within the two towns on the basis of birth figures taken from a single year seemed rather ambitious.

Chapter Nine: Notes

- (1) These particular figures are taken from Table 5.3, although the reweighted mean figures in Table 5.4 also indicate a substantial disparity between the two groups..
- (2) See Chapter 5, Tables 5.5 and 5.6.
- (3) See Chapter 6, pp.153-4 and Table 6.7.
- (4) See Chapter 5, Table 5.10.
- (5) See Chapter 5, Table 5.11.
- (6) See Chapter 5, Table 5.12.
- (7) For example, see Chapter 7, Tables 7.1 to 7.3.
- (8) Chapter 7, Tables 7.5 and 7.6.
- (9) See Chapter 8, Table 8.1.
- (10) See, in particular, the age of mother at last birth data in Table 8.5 and the length of the last birth interval material in Table 8.6.
- (11) See Chapter 8, Table 8.2.
- (12) See Chapter 5, Tables 5.16 and 5.17.
- (13) See Chapter 5, Tables 5.18 and 5.19.
- (14) See Chapter 5, Tables 5.22 and 5.23.
- (15) Chapter 6, Table 6.3.
- (16) See Chapter 7, Tables 7.9 and 7.10.
- (17) See Chapter 8, Table 8.8.
- (18) See Chapter 8, Table 8.9.
- (19) Chapter 8, see Tables 8.10 and 8.11.
- (20) For a discussion, see Chapter Three pp.44-6 especially p.46.
- (21) See Chapter Three, pp.56-57.
- (22) See Chapter Three, pp.49-51. The record linkage work, which involved the examination of census enumerators' books 1861-91 for both towns, suggests, in a fairly subjective way, that boarders were more commonly present in the family units under study in the iron town.

- (23) See Chapter 3, Tables 3.2 and 3.3 which give the relevant sex ratio figures.
- (24) See, for example, Easterlin (1978).
- (25) See Chapter Four pp.98-99 for a discussion of this point and Caldwell (1982).
- (26) For a limited discussion, see Chapter Three pp.52-55.
- (27) See, for example, Chapter 5, Table 5.6.
- (28) Chapter 6, Table 6.3.
- (29) See Chapter 3, Tables 3.2 and 3.3.
- (30) See Chapter 3, pp.57-59.
- (31) For a national comparison, see Chapter 5, Table 5.7 and the following discussion.
- (32) See Chapter 6, Table 6.1.
- (33) See, for example, Chapter 6, Table 6.2 and also the age-specific fertility data in Chapter 7, Table 7.1.
- (34) See Chapter 3, pp.52-55.
- (35) See Chapter 4, p.87.
- (36) See Chapter 4, p.91.
- (37) On the other hand, although the Bradlaugh-Besant trial was reported in *The Scotsman* on the 22nd and 29th June 1877, it is impossible to ascertain the effect of this coverage in the context of a town like Hawick. It would probably depend more on the extent of attention given to the trial in more locally-based newspapers and unfortunately a content analysis along these lines was not conducted within the present research.
- (38) For a discussion, see Chapter 4, p.87.
- (39) For a discussion, see Chapter 4, pp 91-2, 99-100.
- (40) For example, the 1851 census of church attendance might possibly have provided limited evidence in relation to this matter but this source was not used in this thesis.
- (41) In fact the comparison of age of marriage between the two data sets was considered very problematic in light of the potential bias inherent in the selection methods adopted for each set of data. However, the brief discussion suggested that female age of marriage had probably not altered significantly between the 1855 and 1871 data, see Chapter 8, pp.189-192.

- (42) See Chapter 3, pp.44-6 and 46-9. Moreover this downturn may have been beginning to be felt most by the 1880s and this may have been a further factor encouraging the textileworkers to begin the practice of family limitation in the later stages of their reproductive careers since the two phenomena were occurring simultaneously.
- (43) Gulvin (1973) pp.165-180, see, in particular, p.171.
- (44) Knodel (1977); see also Chapter Four, p.91.
- (45) Lesthaeghe and Wilson (1982).
- (46) See Chapter 5, Tables 5.18 and 5.19 for age of marriage and Tables 5.22 and 5.23 for the last birth interval.
- (47) See Chapter 5, Tables 5.16 and 5.17.
- (48) See Chapter 5, Tables 5.16 and 5.17 especially the lower quartile information.
- (49) For a discussion of the need for micro-level studies, see Chapter 1, in particular, pp.1-2; Woods (1983) makes an appeal for micro-level studies capable of encompassing the examination of individual motivation.
- (50) One substantial ray of hope lies in certain work currently under investigation in the Department of Economic and Social History at Edinburgh University by Donald Morse.
- (51) Almost by accident a fascinating piece of evidence was uncovered during the preparation of the thesis. The grandmother of a personal friend had been told that her birth in 1881 had been the subject of considerable surprise and disbelief among the local population of a working class district of Newcastle; the reason being that her mother was forty three years old. Evidently in this place and at this time it was more usual for couples to abstain from sexual intercourse after the age of forty with the deliberate intention of limiting family size. Now, what is most intriguing is the scale of local reaction which was described as strongly negative. This tends to indicate that this particular form of normative behaviour had been established for some considerable time. Quite obviously a single fragment of anecdotal evidence is insufficient to substantiate claims that family limitation may have already been normatively prescribed in certain areas of Newcastle by, say, the early 1880s; however, it does highlight the type of evidence which would ideally be required in any comprehensive analysis of family limitation in the nineteenth century.

REFERENCES

- AKERMAN, S., 1981 "How did the Great Decline in Fertility Start? A study based on retrospective interviews" in **Tradition and Transition**, Report No. 2 Demographic Data Base. University of Umea, Sweden.
- ANDERSON, M., 1971, **Family Structure in Nineteenth Century Lancashire**, Cambridge: Cambridge University Press.
- ANDERSON, M., 1976a, "Sociological history and the working class family: Smelser Revisited", **Social History**, 1 317-334.
- ANDERSON, M., 1976b, "Marriage Patterns in Victorian Britain: An Analysis Based on Registration District Data for England and Wales 1861". **Journal of Family History**, 1, 55-78.
- ANDERSON, M. 1979. "Some problems in the use of census type material for the study of family and kinship systems", **Time, Space and Man - Essays on Microdemography**, Reports from symposium in Sweden, June 1977, Humanities Press Inc.: U.S.A.
- ANDERSON M., 1980, **Approaches to the History of the Western Family, 1500-1914**, London: Macmillan.
- ANDERSON, M., (ed.) 1983a, "Review of the Population History of England 1541-1871", **Social History**, 8(2).
- ANDERSON, M. 1983b, "What is new about the modern family: an historical perspective", **O.P.C.S. Occasional Paper**, 31, 2-16.
- ANDERSON, M., 1984 "The Social Position of Spinsters in Mid-Victorian Britain", **Journal of Family History**, 9, 377-393.
- ARNOT, R. PAGE, 1955, **A History of the Scottish Miners**, London: Allen and Unwin
- BANKS, J.A., 1954, **Prosperity and Parenthood**, London: Routledge and Kegan Paul.
- BANKS, J.A. and BANKS, O., 1954, "The Bradlaugh-Besant Trial and the English Newspapers", **Population Studies**, 8, 22-34.
- BANKS, J.A., 1981 **Victorian Values: Secularism and the Size of Families**, London: Routledge and Kegan Paul.
- BECKER, G.S., 1960, "An Economic Analysis of Fertility", **Demographic and Economic Change in Developed Countries**, New York: National Bureau of Economic Research.
- BECKER, G.S. 1965, "A Theory of the Allocation of Time", **Economic Journal**, 75, 493-517.

- BELL, LADY (FLORENCE EVELEEN ELEANORE OLLIFFE), 1907, **At The Works: A study of a manufacturing town**, David and Charles Reprints (1969), Newton Abbot.
- BEST, G., 1979, **Mid-Victorian Britain, 1851-70**, Glasgow: Fontana.
- BIRCH, A., 1967, **The Economic History of the British Iron and Steel Industry, 1784-1879**, London: Frank Cass.
- BLAKE, J., 1968, "Are Babies Consumer Durables? A Critique of the Economic Theory of Reproductive Motivation" **Population Studies**, 22, 3-25.
- BOURDIEU, P., 1976, "Marriage Strategies as Strategies of Social Reproduction" in Forster, R. and Ranum, O. (eds.) **Family and Society, Selections from the Annals**, Baltimore: John Hopkins University Press.
- BOURGEOIS-PICHAT, J., 1965a, "Les facteurs de la fecondite non dirige", **Population**, 20, 383-424.
- BOURGEOIS-PICHAT, J., 1965b, "The General Development of the Population since the Eighteenth Century" in D.V. Glass and D.E.C. Eversley (eds.), **Population in History**, London: Edward Arnold.
- BOURGEOIS-PICHAT, J., 1967, "Social and Biological Determinants of Human Fertility in Non-Industrial Societies", **Proceedings American Philosophical Society**, 111, 160-63.
- BOWLEY, A.L., 1900, **Wages in the United Kingdom in the 19th century**, Cambridge: Cambridge University Press.
- BOWLEY, A.L., 1902, "Wages in Woollen and Worsteds in W. Riding, Yorkshire", **Journal of Royal Statistical Society**, 65, 102-126.
- BOYD, K.M., 1980, **Scottish Church Attitudes to Sex, Marriage and the Family, 1850-1914**, Edinburgh: John Donald.
- BRASS, W. and KABIR, M., 1977, "Regional Variations in Fertility and Child Mortality during the Demographic Transition in England and Wales" in J. Hobcraft and P. Rees (eds.) **Regional Demographic Development**, London: Croom Helm.
- BRAUN, R. 1978, "Protoindustrialisation and Demographic Changes in the Canton of Zurich" in C. Tilly (ed.) **Historical Studies of Changing Fertility**, Princeton: Princeton University Press.
- BREMNER, D., 1869, **The Industries of Scotland: Their Rise, Progress and Present Condition**, David and Charles Reprints (1969): Newton Abbot.
- BUMPASS, L.L. and WESTOFF, C.F. 1970, "The 'Perfect Contraceptive' Population", **Science**, 169, 1177-82.

- BYRES, T.J., 1967, "Entrepreneurship in the Scottish Heavy Industries, 1870-1900" in Payne, P.C. (ed.) **Studies in Scottish Business History**, London: Frank Cass.
- CADELL, H.M., 1913, **The Story of the Forth**, Glasgow: James Maclehose.
- CALDWELL, J.C., 1976, "Towards a Restatement of Demographic Transition Theory", **Population and Development Review**, 2, 321-66.
- CALDWELL, J.C., 1978, "A Theory of Fertility: From High Plateau to Destabilisation", **Population and Development Review** 4, 553-77.
- CALDWELL, J.C., 1981, "The Mechanism of Demographic Change in Historical Perspective", **Population Studies**, 35, 5-27.
- CALDWELL, J.C., 1982, **Theory of Fertility Decline**, London: Academic Press.
- CAMPBELL, R.H., 1961, **Carron Company**, Edinburgh: Oliver and Boyd.
- CAMPBELL, R.H., 1965, **Scotland Since 1707 - The Rise of an Industrial Society**, Oxford: Basil Blackwell.
- CARLSSON, G., 1966, "The Decline of Fertility: Innovation or Adjustment Process" **Population Studies**, 20, 149-174.
- CARR, E.H., 1964, **What is History?**, Harmondsworth: Penguin.
- CENSUS OF ENGLAND AND WALES, 1911, Vol. XIII, Fertility of Marriage Pt. I, Parliamentary Papers 1917-18, Vol. XXXV.
- CENSUS OF ENGLAND AND WALES, 1911, Vol. XIII, Fertility of Marriage, Pt. II (1923).
- CENSUS OF SCOTLAND, 1911, Vol. III, Fertility of Marriage.
- CENSUS OF SCOTLAND, 1851, 1861, 1871, 1881 and 1891, Decennial Census Reports and Tables.
- CHAMBERS, J.D., 1972, **Population, Economy and Society in Pre-Industrial England**, Oxford: Oxford University Press.
- CHAMBLISS, R., 1957, "Median Age at First Marriage in Sweden, 1881-1953", **Milbank Memorial Fund Quarterly**, 35, 280-286.
- CHANDRASEKHAR, S., (ed.) 1981, **"A Dirty, Filthy Book", The Writings of Charles Knowlton and Annie Besant on Reproductive Physiology and Birth Control and an Account of the Bradlaugh-Besant Trial**, Los Angeles: University of California Press.
- CICOUREL, A.V., 1964, **Method and Measurement in Sociology**, New York: Free Press.

- COALE, A.J. and TRUSSELL, T.J., 1974, "Model Fertility Schedules: Variations in the Age Structure of Childbearing in Human Populations", **Population Index**, 40, 185-258.
- COALE, A.J. and TRUSSELL, T.J., 1975, "Erratum", **Population Index**, 41, 572.
- COCKERILL-TANNER, R., 1979, **Patterns of Family Formation**. Unpublished Ph.D. Thesis, University of Edinburgh.
- COLLINS, B.E.A., 1979, **Aspects of Irish Immigration into Scottish Towns during mid 19th century**. Unpublished M.Phil. Thesis, University of Edinburgh.
- COLLS, R., 1977, **The Collier's Rant: Song and Culture in the Industrial Village**, London: Croom Helm.
- COX, P.R., 1976, **Demography** (Fifth Edition), Cambridge: Cambridge University Press.
- CRAMOND, W., 1888, **Illegitimacy in Banffshire: Facts, Figures and Opinions**, Banff, Banffshire Journal Office.
- DAVIES, R., 1983, "In a Broken Dream: Some Aspects of Sexual Behaviour and the Dilemmas of the Unmarried Mother in South West Wales, 1887-1914" **The Journal of the Society for the Study of Welsh Labour History**, 3, (4).
- DAVIS, K. and BLAKE, J., 1956, "Social Structure and Fertility: An Analytic Framework", **Economic Development and Cultural Change**, 4, 211-235.
- DAVIS, R.H., 1861, **Life in the Iron Mills**, (Biographic Interpretation by Tillie Olsen), New York: Feminist Press (1972).
- DEANE, P. and COALE, W.A., 1962, **British Economic Growth, 1688-1959**, Cambridge: Cambridge University Press.
- DRAKE, M. (ed.), 1969a, **Population in Industrialisation**, London: Methuen.
- DRAKE, M., 1969b, **Population and Society in Norway 1735-1865**, Cambridge: Cambridge University Press.
- DUESENBERY, J.S., 1960, "Comment" on G.S. Becker's article in **Demographic and Economic Change in Developed Countries**.
- DUNCAN, J.M., 1866, **Fecundity, Fertility, Sterility and Allied Topics**, Edinburgh: Adam and Charles Black.
- DUPAQUIER, J. and LACHIVER, M., 1969, "Sur les Debuts de la Contraception en France" **Annales E.S.C.**, 24, 1391-1406.
- DURKHEIM, E., 1964, **The Rules of Sociological Method**, New York: Free Press.

- EASTERLIN, R.A., 1968, "The American Baby Boom in Historical Perspective" in Heer, D.M. (ed.) **Readings on Population**, New Jersey: Prentice Hall.
- EASTERLIN, R.A., 1969, "Towards a Socioeconomic Theory of Fertility: A Survey of Recent Research on Economic Factors in American Fertility" in Behrman, S.J., Corsa, L. and Freedman, R. (eds.) **Fertility and Family Planning - A World View**, Ann Arbor: University of Michigan Press.
- EASTERLIN, R.A., 1978, "The Economics and Sociology of Fertility: A Synthesis", in Tilly, C. (ed.) **Historical Studies of Changing Fertility**, New Jersey: Princeton University Press.
- EATON, J.W. and MAYER, A.J., 1953, "The Social Biology of Very High Fertility Among the Hutterites", **Human Biology**, 25, 206-264.
- ELDER G.H. Jnr, 1981, "History of the Family: The Discovery of Complexity", **Journal of Marriage and the Family**, 43, (3).
- ELDERTON, E.M., 1914, "Report on the English Birthrate Part I - England, North of the Humber" **Eugenics Laboratory Memoirs** Vol. 19-20, London: Dulau and Co. Ltd.
- ERIKSSON, I. and ROGERS, J., 1978, **Rural Labour and Population Change: Social and Demographic Developments in East-central Sweden during the Nineteenth Century**, Uppsala: Acta Universitatis, Upsaliensis.
- ERMISCH, J., 1979, "The Relevance of the 'Easterlin Hypothesis' and the 'New Home Economics' to Fertility Movements in Great Britain", **Population Studies**, 33, 39-58.
- ERMISCH, J. 1983, **The Political Economy of Demographic Change**, London: Heinemann.
- FELKIN, W., 1867, **History of the Machine-Wrought Hosiery and Lace Manufacturers**, David and Charles (1967): Newton Abbot.
- FLANDRIN, J.-L., 1979, **Families in Former Times: Kinship, household and sexuality**, Cambridge: Cambridge University Press.
- FLINN, M., et. al., 1977, **Scottish Population History: From the 17th century to the 1930s**, Cambridge: Cambridge University Press.
- FRIEDLANDER, D., 1973, "Demographic patterns and socioeconomic characteristics of the coal-mining population in England and Wales in the nineteenth century", **Economic Development and Cultural Change**, 22, 39-51.
- FRISCH, R.E., 1978, "Population, Food Intake and Fertility", **Science**, 199, 22-30.
- FYRTH, H.J. and COLLINS, H., 1959, **The Foundryworkers: A Trade Union History**, Manchester: Amalgamated Union of Foundry Workers.

- GALTUNG, J., 1967, **Theory and Methods of Social Research**, London: Allen and Unwin.
- GAUNT, D., 1977, "Pre-industrial economy and population structure" **Scandinavian Journal History**.
- GILLORAN, A.J., 1979, "Seasonality of Marriage". Unpublished M.A. Dissertation, Department of Sociology, Edinburgh University.
- GITTINS, D., 1982, **Fair Sex: Family Size and Structure, 1900-39**, London: Hutchinson.
- GLASS, D.V., 1938, "Changes in Fertility in England and Wales, 1851-1931" in Hogben, L. (ed.) **Political Arithmetic: A Symposium of Population Studies**, London: Allen and Unwin.
- GLASS, D. and REVELLE, R. 1972, **Population and Social Change**, London: Edward Arnold.
- GOLDIN, C., 1977, "Female Labour Force Participation: The Origin of Black and White Differences, 1870 and 1880", **Journal of Economic History**, 37, 87-108.
- GOODY, J., THIRSK, J. and THOMPSON, E.P., 1976, **Family and Inheritance**, Cambridge: Cambridge University Press.
- GREAVES, G., 1862, "Observations on Some of the Causes of Infanticide", **Transactions of the Manchester Statistical Society** 1862-63.
- GULVIN, C., 1973, **The Tweedmakers: A history of the Scottish Fancy Woollen Industry, 1600-1914**, Newton Abbot: David and Charles.
- HAINES, M.R., 1977a, "Fertility, Marriage and Occupation in the Pennsylvania Anthracite Region, 1850-1880", **Journal of Family History**, 2, 28-55.
- HAINES, M.R., 1977b, "Age Specific and Differential Fertility in Durham and Easington Registration Districts, England, 1851-1861", **Social Science History**, 2 (1).
- HAINES, M.R., 1978 "Fertility and Marriage in a 19th century industrial city, Philadelphia, 1850-1880". Paper available from Cambridge Group for the History of Population and Social Structure.
- HAINES, M.R., 1979, **Fertility and Occupation - Population Patterns in Industrialisation**, New York: Academic Press.
- HAIR, P.E.H., 1966, "Bridal Pregnancy in Rural England in Earlier Centuries", **Population Studies**, 20, 233-243.
- HAIR, P.E.H. 1970, "Bridal Pregnancy in Earlier Rural England further examined", **Population Studies**, 24, 59-70.

- HAJNAL, J., 1965, "European Marriage Patterns in Perspective" in D. Glass and D.E.C. Eversley (eds.), **Population in History**, London: Edward Arnold.
- HALL, R., 1898, **History of Galashiels**, Galashiels.
- HAMILTON, H., 1932, **The Industrial Revolution in Scotland**, Oxford: Clarendon Press.
- HAMMOND, J.L. and HAMMOND, B., 1978, **The Town Labourer**, London: Longman.
- HAREVEN, T.K., 1977, "Family Time and Historical Time", **Daedulus**, 57-70.
- HAREVEN, T.K., (ed.), 1978, **Transitions: The Family and the Life Course in Historical Perspective**, New York: Academic Press.
- HAREVEN, T.K. and LANGENBACH, R., 1979, **Amoskeag - Life and Work in an American Factory - City in New England**, London: Methuen.
- HARRISON, J.F.C., 1973, **The Early Victorians, 1832-51**, St. Albans: Panther.
- HAWTHORN, G., 1970, **The Sociology of Fertility**, London: Collier-Macmillan.
- HENRY, L., 1961a, "La Fecondite Naturelle: observation - theorie - resultats", **Population**, 16, 625-634.
- HENRY, L., 1961b, "Some Data on Natural Fertility", **Eugenics Quarterly**, 8, 81-91.
- HENRY, L., 1976, **Population: Analysis and Models**, London: Edward Arnold.
- HEWITT, M., 1958, **Wives and Mothers in Victorian Industry**, London: Rockliff.
- HIMES, N.E., 1936, **Medical History of Contraception**, Baltimore Williams and Wilkins.
- HOBSBAWM, E.J., 1972, "The Social Function of the Past: Some Questions", **Past and Present**, 55.
- HOLLEY, J.C., 1978 **The Redivision of Labour: Two Firms in Nineteenth Century South East Scotland**. Unpublished Ph.D. Thesis, University of Edinburgh.
- HOLLEY, J.C., 1981 "The Two Family Economies of Industrialism: Factory Workers in Victorian Scotland", **Journal of Family History**, 6, 57-69.

- HOLLINGSWORTH, T.H., 1969, "A Demographic Study of the British Ducal Families" in M. Drake (ed.) **Population in Industrialisation** London: University Paperbacks.
- HUNT, E.H., 1973, **Regional Wage Variations in Britain, 1850-1914**, Oxford: Clarendon Press.
- INNES, J.W., 1938, **Class Fertility Trends in England and Wales, 1876-1934**, Princeton: Princeton University Press.
- JENKINS, J.G. (ed.), 1972 **The Wool Textile Industry in Great Britain**, London: Routledge and Kegan Paul.
- JEWKES, J. and GRAY, E.M. n.d. **Wages and Labour in Lancashire Cotton Spinning Industry**, Manchester University Press.
- JOHNSTON, T., 1920, **The History of the Working Classes in Scotland**, EP Publishing Ltd. (1974): Rowman and Littlefield.
- JOYCE, P., 1982, **Work, Society and Politics: The Culture of the Factory in later Victorian England**, London: Methuen.
- KEATING, P. (ed.), 1976, **Into Unknown England, 1866-1913**, Manchester: Manchester University Press.
- KIRK, D., 1960, "The Influence of Business Cycles on Marriage and Birth Rates" in **Demographic and Economic Change in Developed Countries**, National Bureau for Economic Research, New York.
- KNODEL, J. and van de WALLE, E. 1967, "Breast feeding, fertility and infant mortality: an analysis of some early German data" **Population Studies**, 21, 109-131.
- KNODEL, J. 1974, **The Decline of Fertility in Germany, 1871-1939**, New Jersey: Princeton University Press.
- KNODEL, J. 1977, "Family Limitation and the Fertility Transition: Evidence from the Age Patterns of Fertility in Europe and Asia", **Population Studies**, 31, 219-49.
- KNODEL, J., 1979a, "From Natural Fertility to Family Limitation: The Onset of Fertility Transition in a Sample of German Villages", **Demography**, 16, 493-521.
- KNODEL, J., 1979b, "Demographic Transitions in German Villages" Paper prepared for the Summary Conference on European Fertility Princeton, New Jersey.
- KNODEL, J., 1981 "Espace des naissances et planification familiale: une critique de la methode Dupaquier-Lachiver", **Annales E.S.C.**, 36, 473-488. Paper also available in draft, but in English, from Cambridge Group for the History of Population and Social Structure.

- KNODEL, J., 1982, "Child Mortality and Reproductive Behaviour in German Village Populations in the Past: A Micro-Level Analysis of the Replacement Effect", **Population Studies**, 36, 177-200.
- LADURIE, EMMANUEL LE ROY 1979, **The Territory of the Historian**, Sussex: Harvester Press.
- LANDES, D.S., 1969, **The Unbound Prometheus**, Cambridge: Cambridge University Press.
- LASLETT, T.P. R., 1971, **The World We Have Lost**, London: Methuen.
- LASLETT, T.P.R and WALL, R. (eds.) 1972, **Household and Family in Past Time**, Cambridge: Cambridge University Press.
- LASLETT, T.P.R., 1977, **Family Life and Illicit Love in Earlier Generations**, Cambridge: Cambridge University Press.
- LASLETT, T.P.R , OOSTERVEEN, K. and SMITH, R.M. (eds.) 1980, **Bastardy and Its Comparative History**, London: Edward Arnold.
- LEE, R.D. (ed.) 1977, **Population Patterns in the Past** New York: Academic Press.
- LEESON, R.A., 1980, **Travelling Brothers**, London: Granada.
- LEIBENSTEIN, H. 1974, "An Interpretation of the Economic Theory of Fertility Promising Path or Blind Alley?", **Journal of Economic Literature**, 12.
- LENMAN, B., 1977 **An Economic History of Modern Scotland, 1660-1976**, London: B.T. Batsford.
- LESTHAEGHE, R.J., 1978, **The Decline of Belgian Fertility**, Princeton: Princeton University Press.
- LESTHAEGHE, R.J. and WILSON, C., 1982, "Les modes de production, la laicisation et le rythme de la baisse de la fecondite en Europe de l'ouest de 1870 a 1930", **Population**, 37, 623-644.
- LEVINE, D. 1977, **Family Formation in an Age of Nascent Capitalism**, New York: Academic Press.
- LEVINE, D., 1983 "Review of the Population History of England. 1541-1871", **Social History**, 8 (2).
- LITHELL, U.-B., 1981 **Breast-Feeding and Reproduction: Studies in marital fertility and infant mortality in 19th century Finland and Sweden**, Stockholm, Uppsala.
- LOCKRIDGE, K.A., 1983, **The Fertility Transition in Sweden A Preliminary Look at Smaller Geographic Units, 1855-1890**, Report No. 3 for Demographic Data Base , Umea University.

- LOFGREN, O., 1978, "The Potato People Household Economy and Family Patterns among the Rural Proletariat in Nineteenth Century Sweden" in Akerman, S., et. al (eds.) **Chance and Change** Odense University Press.
- LYTHE, S.G.E and BUTT, J., 1975, **An Economic History of Scotland, 1100-1939**, Glasgow: Blackie and Sons Ltd.
- MANTOUX, P. 1964 **The Industrial Revolution in the Eighteenth Century**, London: Methuen.
- MARWICK, W.H., 1936, **Economic Developments in Victorian Scotland**, London: Allen and Unwin.
- MATRAS, J., 1965, "Social Strategies of Family Formation: Data for British Female Cohorts Born 1831-1906", **Population Studies**, 19, 167-181.
- MATTHIESSEN, P C., 1970, **Some Aspects of the Demographic Transition in Denmark**, Copenhagen.
- MEDICK, H., 1976, "The Proto-industrial Family Economy: the structural function of household and family during the transition from peasant society to industrial capitalism", **Social History**, 3, 291-315.
- MENDELS, F., 1972 "Protoindustrialisation: The First Phase of the Industrialisation Process", **Journal of Economic History**, 32, 241-261.
- MINCER, J., 1963, "Market Prices, Opportunity Costs and Income Effects", **Measurement in Economics**, Stanford: Stanford University Press.
- MORROW, R.B., 1978, "Family Limitation in Pre-Industrial England: A reappraisal", **Economic History Review**, 31, 419-428.
- MUELLER, E., 1972 "Economic Motives for Family Limitation", **Population Studies**, 26, 383-403.
- MURRAY N., 1978 **The Scottish Hand Loom Weavers, 1790-1850: A Social History**, Edinburgh: John Donald.
- MACDONALD, D.F., 1937, **Scotland's Shifting Population, 1770-1850**, Glasgow.
- MACFARLANE, A., 1979, **The Origins of English Individualism**, Oxford Basil Blackwell.
- MCGEOWN, P., 1968, **Heat the Furnaces Seven Times More** London: Hutchinson.

- MCLAREN, A., 1977, "Women's Work and Regulation of Family Size: the question of abortion in the nineteenth century", **History Workshop**, No. 4.
- MCLAREN, A., 1978 **Birth Control in Nineteenth Century England**, London: Croom Helm.
- MCVAIL, J.C., 1911, **Report on the Housing of Miners in Stirlingshire and Dunbartonshire**, Glasgow: Robert Maclehose.
- NAMBOODIRI, N.K., 1972. "Some Observations on the Economic Framework for Fertility Analysis", **Population Studies**, 26, 185-206.
- NEW STATISTICAL ACCOUNT, Entries on Falkirk (1840) and Hawick (1838).
- NIMMO, W., 1880 **The History of Stirlingshire**, Glasgow: Thomas Morison.
- NIVEN, D., 1979 **The Development of Housing in Scotland**, London: Croom Helm.
- OLIVER, T., 1911 **A Phase in the Rise of the Scotch Tweed Trade**, Galashiels.
- OUTHWAITE, R.B. (ed.), 1981, **Marriage and Society: Studies in the Social History of Marriage**, London: Europa Ltd.
- PAYNE, P.L. (ed.), 1967, **Studies in Scottish Business History**, London: Frank Cass.
- PEEL, J. (1963), "The Manufacture and Retailing of Contraceptives in England", **Population Studies**, 17, 113-125.
- PORTEOUS, R., n d. **Grangemouth's Modern History, 1768-1968**.
- QUARTERLY JOURNAL OF THE ROYAL STATISTICAL SOCIETY 1848, Investigation into the State of the Poorer Classes in St. George's in-the-East, August, 1848, vol. xi, 193-249.
- REPORT ON STATISTICS OF EMPLOYMENT OF WOMEN AND GIRLS, 1894 Board of Trade.
- REPORT OF THE SUB-COMMITTEE ON UNFIT HOUSING, 1967, **Scotland's Older Houses**, Edinburgh: HMSO.
- RIDEN, P , 1977, "The Output of the British Iron Industry before 1870", **Economic History Review**, 30, 442-459.
- ROBERTS, R., 1979, **A Ragged Schooling**, Glasgow: Fontana.
- ROBSON, W.S., 1947, **The Story of Hawick**, Hawick: R. Deans.

- ROYAL COMMISSION ON FRAME WORK KNITTERS, 1845, **Report of the Commissioners into the Condition of the Frame-Work Knitters**, Parliamentary Papers, xv.
- ROYAL COMMISSION ON HOUSING OF INDUSTRIAL POPULATION OF SCOTLAND: **RURAL AND URBAN**, 1917-18, xiv Cd. 8731.
- ROYAL COMMISSION ON POPULATION, 1949, "Family Limitation and its Influence on Human Fertility during past 50 years", Vol. I.
- RUBINSTEIN, D., 1974, **Victorian Homes**, London: David and Charles.
- RYDER, N.B., 1974, "Comment" on Willis, R.J., "Economic Theory of Fertility Behaviour" in Schultz, **Economics of the Family**, Chicago: University of Chicago Press.
- SAMUEL, R. (ed.), 1977, **Miners, Quarrymen and Saltworkers**, History Workshop Series, London: Routledge and Kegan Paul.
- SCHULTZ, T.W. (ed.), 1974, **Economics of the Family: Marriage, Children and Human Capital**, Chicago: University of Chicago Press.
- SCOTT, J.W. and TILLY L.A., 1975, "Women's Work and the Family in Nineteenth-Century Europe", **Comparative Studies in Society and History**, 17, 36-64.
- SHORTER, E., 1971, "Illegitimacy, sexual revolution and social change in modern Europe", **Journal of Interdisciplinary History** 2, 237-272.
- SHORTER, E., 1977, **The Making of the Modern Family**, Glasgow: Fontana.
- SINTON, J., n d. List of books relating to or published in Counties of Roxburgh, Selkirkshire and Peeblesshire.
- SLATER, E. and WOODSIDE, M., 1951, **Patterns of Marriage: A Study of Marriage Relationships in the Urban Working Classes**, London: Cassell and Co.
- SMELSER, N.J., 1959, **Social Change in the Industrial Revolution - An Application of Theory to the Lancashire Cotton Industry, 1770-1840**, London: Routledge and Kegan Paul.
- SMOUT, T.C., 1972, **A History of the Scottish People, 1560-1830**, Glasgow: Fontana.
- SMOUT, T.C., 1976, "Aspects of Sexual Behaviour in Nineteenth-Century Scotland" in A. MacLaren (ed.), **Social Class in Scotland, past and present**, Edinburgh: John Donald.
- SMOUT, T.C., 1981, "Scottish Marriage, Regular and Irregular 1500-1940", in Outhwaite R.B. (ed.), **Marriage and Society**, London: Europa Ltd.

- STEVENSON, T.H.C., 1920, "The Fertility of Various Social Classes in England and Wales from the Middle of the Nineteenth Century to 1911", **Journal of Royal Statistical Society**, 83, 401-432.
- STONE, L., 1977, **The Family, Sex and Marriage (In England 1500-1800)**, London: Weidenfeld and Nicolson.
- SUNDT, E., 1855, **On Marriage in Norway**, Cambridge: Cambridge University Press (1980) Translated by M. Drake
- TARN, J.N. 1971, **Working Class Housing in 19th century Britain**, Architectural Association Paper No. 7, London: Lund Humphries.
- TAYLOR, A.J., 1975, **The Standard of Living in Britain in the Industrial Revolution**, London: Methuen.
- TEITELBAUM, M.S., 1985, **The British Fertility Decline**, Princeton: Princeton University Press.
- THOMPSON, E P., 1968, **The Making of the English Working Class**, Harmondsworth: Penguin.
- THOMPSON, E P , 1977, Review of Stone, The Family, Sex and Marriage, **New Society**.
- TILLY, C. (ed.) 1978, **Historical Studies of Changing Fertility**, Princeton: Princeton University Press.
- TILLY, L.A. and SCOTT, J.W., 1978, **Women, Work and Family**, New York: Holt, Rinehart and Winston.
- TILLY, L., 1979, "Occupational structure, women's work, and demographic change in two French industrial cities, Anzin and Roubaix, 1872-1906" in **Time, Space and Man - Essays on Microdemography**, Humanities Press Inc., U.S.A.
- UDNY, Y., 1906. "Marriage and Birth Rate Changes in England and Wales", **Journal of Royal Statistical Society**, 69, 88-132.
- VINOVSIS, M.A. (ed.), 1979, **Studies in American Historical Demography**, New York: Academic Press.
- WARD, J.T. (ed.), 1975, **The Age of Change, 1770-1870**, London: Adam and Charles Black.
- WATSON, D.M., 1868, "The Early History of Textile Manufacturers and their preparatory Processes" (March Issue) "The Early Manufacturers of Hawick" (April Issue). **Transactions of the Hawick Archaeological Society**.
- WEIR, D.R. 1984, "Rather Never Than Late: Celibacy and Age at Marriage in English Cohort Fertility 1541-1871", **Journal of Family History**, 9, 340-354.
- WELLS, F A., 1935, **The British Hosiery and Knitwear Industry: Its**

- History and Organisation**, Newton Abbot: David and Charles, 1972.
- WELLS, F.A., 1968, **Hollins and Viyella: A study in business history**.
- WILSON, C., 1984, "Natural Fertility in Pre-industrial England 1600-1799", **Population Studies**, 38, 225-240.
- WILSON, R., 1825, **A Sketch of the History of Hawick**, Hawick: Robert Armstrong.
- WOHL, A.S. (ed.), 1978, **The Victorian Family: Structure and Stresses**, London: Croom Helm.
- WOOD, G.H., 1910 **History of Wages in Cotton Trade during past 100 years**, London: Sherratt and Hughes.
- WOODS, R., 1982, **Theoretical Population Geography**, London: Longman.
- WOODS, R. and SMITH, C., 1983, "The Decline of Marital Fertility in the Late Nineteenth Century: The Case of England and Wales", **Population Studies**, 37, 207-225.
- WRIGLEY, E.A., 1961 **Industrial Growth and Population Change**, Cambridge: Cambridge University Press.
- WRIGLEY, E.A. (ed.), 1966a, **An Introduction to English Historical Demography (From the 16th century to the 19th century)**, London: Basic Books.
- WRIGLEY, E.A., 1966b, "Family Limitation in Pre-Industrial England" **Economic History Review**, 19, 82-109.
- WRIGLEY, E.A., 1972, **Nineteenth-century society: Essays in the use of quantitative methods for the study of social data**, Cambridge Cambridge University Press.
- WRIGLEY E.A., 1978a, "Fertility Strategy for the Individual and the Group" in C. Tilly (ed.), **Historical Studies of Changing Fertility**, Princeton: Princeton University Press.
- WRIGLEY, E.A., 1978b, "Marital Fertility in Seventeenth-Century Colyton: A Note" **Economic History Review**, 31, 429-436.
- WRIGLEY, E.A. and SCHOFIELD, R.S. 1981, **The Population History of England 1541-1871: A Reconstruction**, London: Edward Arnold.
- WRIGLEY, E.A. and SCHOFIELD, R.S., 1983, "English Population History from Family Reconstitution: Summary Results 1600-1799", **Population Studies**, 37, 157-184.
- YOUNG, G.M., 1960, **Victorian England: Portrait of an Age** London: Oxford University Press.